THE NATIONAL GEOGRAPHIC MAGAZINE

Vol. XIV DECEMBER, 1903 No. 12

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VOL. XIV, No. 12 WASHINGTON DECEMBER, 1903

THE NATIONAL GEOGRAPHIC MAGAZINE

THE VALUE OF ARCTIC EXPLORATION*

BY COMMANDER ROBERT E. PEARY, U. S. N.

IT is entirely appropriate that the first public exposition of the present phase of Arctic exploration and my own plans for the coming season should be given in the National Capital and under the auspices of the National Geographic Society. It is unnecessary for me to note here the continued and unfailing interest in and courtesy toward my Arctic work which has been shown by this Society during the past twelve years. You are well aware of it; I am well aware of it.

I shall endeavor to place clearly before you tonight the plan of my campaign, and the means by which I hope to accomplish the object which you all know that I have before me. I hope that I may be fortunate in sending every one of you away with definite ideas, which will enable him or her to keep in touch with events as they materialize during the next two or three years.

EARLY PROGRESS OF DISCOVERY

Before taking up present plans, let us go back a bit. Some forty-five centuries ago the known world lay within a little circle whose circumference touched the Black and Caspian seas, the head of the Persian Gulf and the Red Sea, and the eastern end of the Mediterranean. Centuries later the fearless Phœnicians had dared the terrors of the infinite ocean which lay beyond the Pillars of Hercules, and sailed along the coasts both north and south. East they had pioneered the way to India. The fabled voyages of Ulysses and Jason dwindle beside their splendid distances. Still later came the work of the great explorer-conquerors, Alexander and Cæsar, opening up far-distant lands as the Phœnicians opened up far-distant seas.

Then came that great burst of exploration, the principal facts of which we know so well. Vasco de Gama to the south; Othere and the Vikings to the north, Erik and Leif, Columbus and Cabot to the west, lifted Africa, the northern headlands of Europe, and the western world from the mists.

Magellan, following close upon their heels, circled the globe, and the world, as we know it now, lay revealed in its rough, broad masses.

Since then exploration has, of necessity, been a work of large details, baring

*An address before the National Geographic Society, October 24, 1903.

the hearts of continents, and pushing northward and southward, till today only the northern and southern apices of the earth still hide in the mists and gloom of the polar nights.

A little less than four centuries ago the first expedition started out toward the North Pole. Since that time, with periods of greater or less intensity, practically all the civilized nations of the earth have made attempts to reach that charmed spot.

Millions have been expended in the efforts, and, though they have brought back information and accessions to scientific knowledge which have fully repaid the expenditures, the main object remains still unattained. The ablest writers, scientists, geographers, statesmen, and rulers have been interested in the matter, and have urged the prosecution of the work with all the eloquence at their command. Many of their remarks upon the subject have become historic.

THREE NORTH POLAR ROUTES

As a result of all these explorations extending through nearly four centuries, the possible routes to the North Pole have dwindled to three. In my own personal opinion, they have dwindled to two, but I note the three. First, the drift method as devised, inaugurated, and put into execution by Nansen. The possibilities of this method are acknowledged by every one, but it by no means follows that another ship, or even the *Fram* herself in a second attempt, would be as fortunate as she was in the first voyage. Again, it requires a man of exceptional temperament and a crew of almost superhuman qualities to undertake a voyage which means that for four or five years at least ship and people are but a helpless bit of flotsam entirely at the mercy of the ice in which they are drifting and practically unable to control their own fortunes or contribute by their efforts to success. Presumably Nansen and Sverdrup are advocates of this route; yet neither has, to my knowledge, expressed a desire to repeat the experience of the *Fram's* voyage. Bernier is reported as contemplating a repetition of the voyage.

The second route is the so-called Franz Josef Land route. Wellman, Baldwin, and Mr Ziegler are advocates and adherents of this route. If there are others, I do not recall them at present.

Payer and Weyprecht, Leigh Smith, Jackson, Wellman, Abruzzi, and Baldwin have all exploited the Franz Josef Land route with greater or less success. Of these various expeditions, however, Abruzzi's is the only one that has succeeded in pushing beyond the northern limit of the Franz Josef Archipelago. He is not at all in favor of this route. In fact, he uncompromisingly advocates, in words I shall quote to you later, the third—the Smith Sound, or "American" route.

PLANS FOR COMING EXPEDITION

To come down to the present, I assume that all of my hearers are familiar, in a general way, with what I shall attempt to do and how I shall attempt to do it, but I have noticed so many misapprehensions as to details on the part of otherwise well-informed people, that I feel a brief exposition of certain points may not be out of place.

I plan to take two ships—one a steamer with engines of maximum horse-power and minimum weight and bulk, and an auxiliary vessel to carry coal. With the steamer I plan, in the summer of 1904, to push up Smith Sound, Kennedy Channel, and Robeson Channel, and then to station her for the winter on the north coast of Grant Land, carrying her, if possible, farther north than the *Alert* or the *Polaris*. If she can get me as far as that, I do not care what becomes of her—she will

have served her purpose of getting me to 82° 50′, Cape Joseph Henry, which will be my base of action. The second vessel will carry a large freight of coal, which will be landed on Grant Land, near the northern entrance of Robeson Channel. With this reserve of coal I will not have to economize the fuel of my steamer, but can keep the furnaces and engines going at utmost tension through the ice. The reserve will also be there to take my steamer back after her work is done, if she is still alive. From Cape Joseph Henry the march toward the Pole will begin in 1905. The distance from this point to the Pole and back again is less than the average distance of my four sledging trips in 1892, 1895, 1900, and 1902. There is no reason why I should not equal this distance on my next sledging trip, thus gaining the Pole and getting back again in one season of 100 days. I shall take my Eskimos with me to my northern base.

On my return to Cape Joseph Henry after the polar dash, I plan to return in my steamer from that point if conditions are favorable. If the ice is impenetrable or my steamer is unable to carry me, I shall proceed by land southward to Cape Sabine, over the route which I laid out and which I have traveled so often in the past. At Sabine my auxiliary vessel would meet me and bring me home.

The principal departures in my new plan are: First, using a powerful steamer to force my way through the ice, instead of a sailing ship with auxiliary engines; and, second, making my base on the shore of the Polar Sea, more than 200 miles north of my previous base at Cape Sabine.

Abruzzi's remarks upon the subject of the attainment of the Pole are particularly valuable as well as extremely interesting. His words are given in full:

"It would be useless to repeat the attempt (of reaching the Pole) by following the same plan (the route from Franz Josef Land). It would, at most, be possible to push a few miles farther towards the north if the ice of the Arctic Ocean was in an unusually favorable state; but the results would not afford any compensation for the fatigue and privations undergone. While following, therefore, the invariable plan of setting out from some point on land, and not from a ship drifting on the ice, on account of the reasons put forth in the first chapter of this work, it will be necessary to find some other method of shortening the distance which has to be traveled with sledge. What I should recommend would be to sail along the western coast of Greenland to the north of Kennedy Sound, where it ought to be possible, under favorable conditions, to go to a still higher latitude than that reached by the *Alert* off Grant Land."

This is the plan of campaign which Assistant Secretary Darling has been pleased to commend, and for the execution of which he has granted the necessary leave. This is the plan which has the approval and sympathy of President Roosevelt.

Assistant Secretary Darling, in granting leave for the purpose of this expedition, has continued the traditions of the Navy Department, and has associated himself with Dobbin, Kennedy, Robeson, and Chandler, all of whose names are inscribed on our Arctic charts. He has also put himself in line with a long list of British Lords of the Admiralty, who have seen the moral as well as the material utility of Arctic exploration, and have fostered and encouraged it with all the means at their command.

President Roosevelt, in expressing his sympathy and approval of the work (as was naturally to be expected from his big, active temperament), associates himself with a long list of illustrious names in the past—Ferdinand of Spain, Charles V, Henry VII, Elizabeth, etc.,

all patrons of exploration. He has also abundant company among foreign rulers of the present time. The expeditions of Scott, Drygalski, Nordenskjold, Nansen, Sverdrup, and De Gerlache have had respectively the strong personal support and approval of Edward of England, William of Germany, Oscar of Sweden and Norway, and Leopold of Belgium. Charcot's French expedition has the lively support and approval of President Loubet.

It may possibly interest you to know that up to the present time editorial comment from over 500 different newspapers throughout the country have come to my eye, and there is not a hostile note among them; but two or three points have been brought up in these notices which it may be well to touch upon briefly. I do not speak of them in a captious mood, but with a desire to set the points straight.

One is the statement of the President of the Royal Geographical Society of London, that "after Nansen's voyage, there is no longer any geographical object in going to the North Pole, except for the sake of deep-sea soundings, for it is merely a point in the polar ocean, the economy of which has been made known by Nansen. That great explorer finally removed the veil which concealed the secret of the Arctic regions."

The President of the Royal Geographical Society is a strong personal friend of mine, but I cheerfully disagree with him on some points, and particularly the one which assumes that we have practically reached the North Pole, and, in substance, know all that is necessary to know about it. I have never been entirely in sympathy with the claims put forth immediately after Nansen's return from his voyage in the *Fram*, that he had practically reached the Pole; that we now knew everything that it was necessary to know in regard to that region, and that any further efforts were not worth while.

A distance of 260 miles from the Pole is a long ways from the actual attainment of the Pole, and to assert that the secret of the Pole has been penetrated and the veil lifted, at a range of 260 miles, and that the economics of the polar basin have been revealed, when 3,000,000 square miles of it have not been trodden by human foot or seen by human eye, is an enthusiastic view.

ERRONEOUS THEORIES OF EXPLORERS AND GEOGRAPHERS

There is no portion of the earth's surface where it is more distinctly impossible to prophesy or forecast what is beyond the horizon of actual vision than in the Arctic regions. The truth of this statement has been most strikingly exemplified in the past.

In 1818 Sir John Ross made a voyage to Baffin Bay, and returning reported that body of water to be a closed sea. To the westward, at the head of an inlet which he called Lancaster Sound, he showed on his chart a striking range of mountains.

A few years later Parry entered the Sound, and before a favoring wind went spanking away to the westward beyond the hundredth meridian, and never saw these mountains. Later explorations showed the great inlet of Smith Sound extending, as we now know, to the central polar basin, and Jones Sound penetrating far to the northwestward, also leading from this "closed sea."

Again it was conclusively determined theoretically, by geographers, that the interior of Greenland was a fertile, or at least an ice-free country, surrounded by an ice barrier near the coast. Further explorations show the interior to be absolutely and completely buried under an enormous ice-cap.

Kane and Hayes stood upon the shores of the open polar sea, as they supposed; yet that open polar sea has not only retreated but absolutely disappeared before the footsteps of subsequent explorers.

Petermann, one of the greatest of geographers, proved conclusively, in a theoretical way, that Greenland was one extremity of a great Arctic continent extending across the Pole, and Wrangel Land the other. Later the *Corwin* determined Wrangel "Land" to be an almost insignificant island of contracted dimensions, and we know now that Greenland ends 450 miles short of the Pole.

For years Franz Josef Land was supposed to be the southern extension of an Arctic continent, yet the *Fram* drifted across its meridian north of it, seeing no land; so the instances could be duplicated.

As a matter of fact, there may be land within 30 miles of Nansen's or Abruzzi's farthest, and yet neither of them the wiser for it. Until we reach the Pole no one can say what there is there, whether land or water.

In the light of these facts, it appears that one man's views are as good as another's, assuming the men to be of equal intellectual caliber.

I feel, therefore, that the opinions of Assistant Secretary Darling are entitled to as much weight as those of Sir Clements or other geographers. To a careful and enthusiastic study of Arctic voyages, extending over a number of years, Judge Darling brings deep thought, clear perception, exceptional ability, and the judicial bent of long legal training. He is strongly impressed with the great probability of finding land in the central polar basin.

For myself, as a practical worker in the field, taking what I find rather than theorizing as to what I ought to find, I recognize fully this probability; and that I have not urged it—in fact, have leaned the other way—is due to the confirmed pessimism which long years of Arctic work and disappointments have taught me—pessimism as to any conditions which will simplify or render easier the work I have laid out for myself.

The existence of land anywhere between the northern shore of Grant Land and the Pole would so greatly simplify my work and reduce its difficulties that I do not let myself dwell upon it. But the possibility is there; an isolated island continent, an Arctic Atlantis, with a fauna and flora of its own, with one day and one night in the year, lying there through the blinding days and opaque nights of countless geologic ages, as completely isolated from the world as if it were on Mars.

Think of the satisfaction of lifting such a land out of the heart of the polar sea with the Stars and Stripes of "Old Glory." Think of writing upon that land some name to endure indelibly till that day when "the heavens shall wither like a scroll," to show forever that we own the top of the earth. Believe me, there is room yet in this prosaic world for a new sensation.

NORTH POLE THE LAST GREAT GEOGRAPHICAL PRIZE

My statement that the North Pole is the last great geographical prize which the earth has to offer has also been criticised in some quarters, and it is claimed that it is nonsense to say that the North Pole is a greater prize than the South Pole. I repeat advisedly that the North Pole is the last great geographical prize which the earth has to offer.

That the particular mathematical point of the North Pole possesses greater interest or value than the South Pole is not asserted, but the North Pole is that apex of the earth which is in the center of the hemisphere of civilization. The North Pole has been sought by men for nearly four centuries; the South Pole for less than a century. The North Pole has a striking place in history, in literature, in poetry, in romance. It has been the subject of infinite speculation, and, finally, when the North Pole has been attained, the attainment of the South Pole will follow naturally and rapidly and will attract much less attention.

In this connection it is well to note also a popular misconception, namely, that the attainment of the South Pole is more difficult than the attainment of the North Pole. This is not so. In spite of the close approximation to the North Pole by recent expeditions, the actual attainment of the North Pole is a very different proposition from the attainment of the South Pole and much more difficult. The conditions are almost diametrically opposite. In the case of the North Pole it is a polar sea which must be traversed and conquered. In the case of the South Pole it is a polar land which must be traversed and conquered. In the light of recent explorations, the region about the South Pole offers facilities for the realization of the favorite popular ideas of attaining the Pole, namely, the colonization method, the method of relay stations short distances apart connected by wire, etc., etc. Plans of colonization, of relay stations, of telegraph connections, etc., etc., fall to the ground in the North Polar region because of the impossibility of effecting anything of this kind upon the moving ice pack of the central polar sea.

The attainment of the South Pole, granted sufficient funds, is only a matter of time and patience. The work can be carried on in any season of the year, and each mile of advance can be permanently secured.

The attainment of the North Pole means the ability to so refine and perfect one's equipment, supplies, and party as to be able to cover a distance of 500 miles each way without caches and without support from the country, and to cover this distance in a time limit of three or at most three and one-half months.

FUNDS FOR THE EXPEDITION

A partially erroneous statement has been generally disseminated which I am glad of the opportunity to correct here. It is to the effect that the Peary Arctic Club will furnish the funds necessary to send out the proposed expedition. This is true only to a certain degree.

The Peary Arctic Club, an unincorporated association of my personal friends, with Morris K. Jesup, of New York city, at its head, furnished the funds for the financing of my last four years of Arctic work. After my return last fall there was a general feeling of disinclination to drop the work uncompleted, when success had been so nearly won. This feeling took form in the proposition of the majority of the club to contribute in varying sums toward the outfitting of another expedition. Unfortunately, however, the total amount which these members of the club felt they could contribute, even with the accession of some new members, was not sufficient to properly fit out an expedition. Had it been sufficient I should have gone north last summer, and should now be settled down in winter quarters somewhere on the Grinnell Land coast.

The same status holds today. The total amount which the continuing members of the Peary Arctic Club feel that they can contribute to another expedition is insufficient to properly outfit the expedition. Additional members, either individuals or associations, are necessary to complete the total amount.

And it is to be said in this connection that it is essential that the total amount should be assured without delay; $150,000 to $200,000 between now and the 1st of January will meet all requirements and give ample time to properly fit out the expedition. Six months from now it will be impossible to fit the expedition even with a half-million available, because of lack of time.

Somewhere in this broad country I am satisfied that the money is waiting, ready and anxious to do this work as I, if only the connection can be estab-

lished. One thing is to be clearly understood, the government is not financing the work. The funds must come from private sources.

It may be said without egotism that a practical experience equaled by that of no other worker in Arctic regions; an interest in the work at least equal to that of any other man; the utmost assistance of the Eskimos, never before available; the time and the opportunity, thanks to Assistant Secretary Darling and the President—all these are assured; the only thing lacking is the money.

I assume that if it were demonstrated that the erection of a monument costing $150,000 would redound to the great credit of its builder or builders and of the city wherein it stood, not only now, but for generations to come, it would not be a very difficult proposition to secure that amount from some public-spirited citizen or citizens in many a prosperous city in this country.

The Pole is a grander monument than any structure of stone or bronze, and a name inscribed upon it would be read and known by future generations when granite and bronze had crumbled to dust and rust.

There is no way by which a man of large means may win for himself in these days a more enviable and lasting name than by assuming the rôle of patron of some large effort to increase our knowledge of the earth.

The principal thing we remember of Ferdinand of Spain is that he sent Columbus to his life work.

All that most of us remember of Grinnell, of New York, is that he sent Kane to his work.

To the millionaire, whether he be young and just starting in life, or elderly and retired from business, it offers a broad and elevated field.

In the words of old Martin Frobisher, it is "the one thing left of this world by which a notable mind may become famous and fortunate."

CONQUEST OF THE POLE SIMPLY A BUSINESS PROPOSITION

The conquest of the Pole is today a business proposition, pure and simple; and, like any business proposition, it can be presented in three sentences of four words each. Can it be done? What will it cost? Is it worth while?

Can it be done? There is not a geographer, a scientist, or an intelligent person conversant with Arctic matters who doubts that the Pole *can* be reached, and that it *will* be reached in a few years.

The requirements are simply those for any large project; sufficient money; proper equipment; adequate time; energy, experience, and determination.

What will it cost? The cost of various Arctic expeditions has ranged from a few thousand to a million dollars each.

On my plan, and with my methods, an expedition which would in all probability secure the Pole, can be fitted out for two years at a cost of $150,000. The only expensive item in that outfit will be a powerful ship which shall push me to the northern shore of Grant Land.

There are hundreds of men in this country today who could defray the expenses of an expedition and never feel it; thousands who could defray a tenth, hundreds of thousands who could defray a hundredth.

We have spent and are spending hundreds of thousands of dollars for an idea or a principle.

Take a single example, the international yacht races. A reliable New York paper stated recently that the cost of the last yacht race to the American side alone was in the neighborhood of $900,000, and that it has cost us to defend the cup in the last five years some $2,200,000.

For less than one-fourth of the former sum, less than one-tenth of the latter, we can secure the Pole.

And how do the races compare?

The races for the America's cup have been in progress for tens of years, be-

tween two nations; the race for the Pole hundreds of years between practically all the civilized nations of the world.

There have been numbers of cup-defender syndicates, and will be numbers more.

The syndicate that lifts the Pole will have no successor and can never be beaten.

The winning of the yacht race is a matter of today; the winning of the Pole is for all time.

Is it worth while? Certainly it is worth while.

As a matter of the valuable additions to geography and science it is worth while.

The head of the Smith Sound route is the one point from which can be reached and welded the links still lacking to make the Arctic exploration a finished job.

THE MORAL PRESTIGE OF GAINING THE POLE WORTH TEN TIMES THE COST

As a matter of prestige it is worth while.

Abruzzi's expedition, costing two hundred thousand dollars, was worth many times its cost to Italy in increased prestige.

Abruzzi drove home to the civilized world the fiber of which Italians are made.

Nansen's expedition, fitted out by his King, his Parliament, and wealthy private citizens, impressed the world with the material which makes up the descendants of the Vikings.

And should *you* some morning read in your paper that an American had placed the Stars and Stripes upon the Pole, each one of you would feel a thrill of pride and enthusiasm, and be glad that you are an American; and every true American at home and abroad would feel the same pride, and that increment of justifiable pride and enthusiasm to each of millions of citizens would be worth ten times the cost in dollars and cents.

As a matter of patriotism based upon the obligations of our manifest destiny, it is worth while.

The North American world segment is our home, our birthright, our destiny. The boundaries of that segment are the Atlantic and the Pacific, the Isthmus and the Pole. We are fully able, I think, to take care of the Atlantic and the Pacific. We are negotiating for the Isthmus. It would be a shame for others to find and mark the Pole for us.

Believe me, the winning of the North Pole will be one of the great mile-stones of history, like the discovery of the New World by Columbus and the conquest of the Old by Alexander; and the man, or the association, or the community, or the nation that makes its discovery possible will write its name to be read and known when, perhaps, the very civilization of today is forgotten.

Let us attain it, then. It is our privilege and our duty. Let us capture the prize and win the race which the nations of the civilized world have been struggling for for nearly four centuries, the prize which is the last great geographical prize the earth has to offer; the race which is far greater than the international yacht races. Then let us take a hand with England, Germany, Sweden, Scotland, and the others for the conquest of the South Pole. As Assistant Secretary Darling well says, the attainment of the Poles is all that remains to complete man's domination of the earth.

Six years ago we were sleeping content within our borders, drowsy of our strength and possibilities. Since then we have embraced the earth, and now right hand clasps left in the far East in a grasp never to be loosened. What a splendid feat for this great and wealthy country if, having girdled the earth, we might reach north and south and plant "Old Glory" on each Pole. How the imagination stirs at the thought!

SURVEYING THE PHILIPPINE ISLANDS

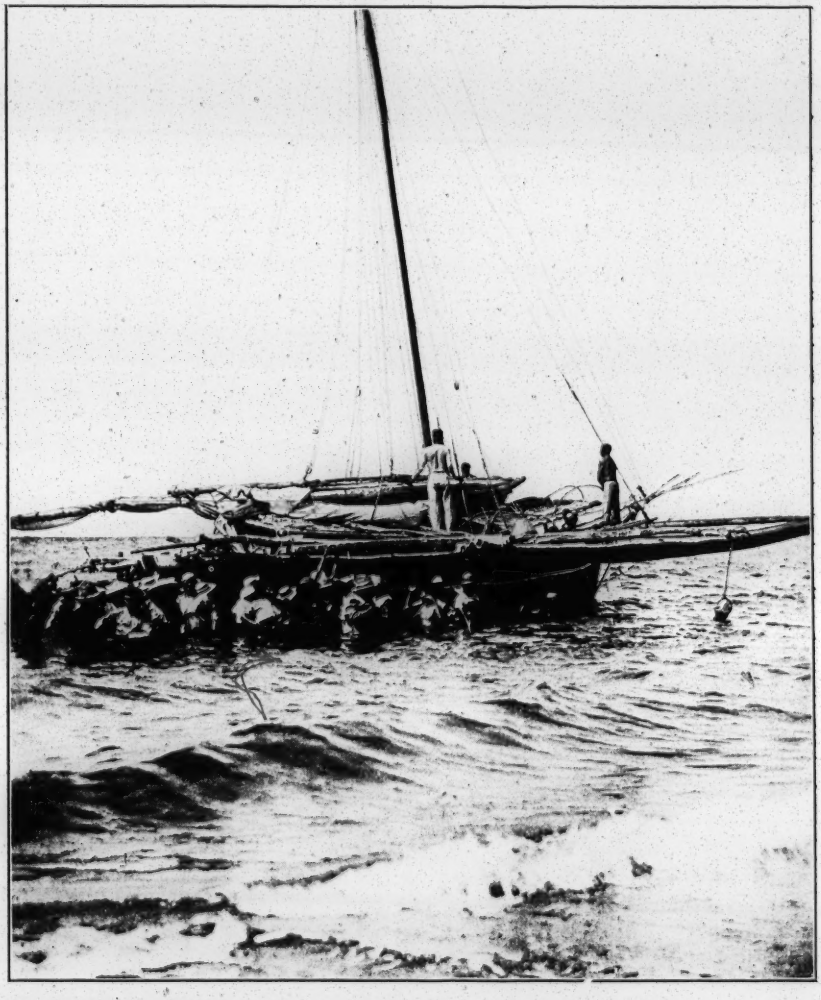
By George R. Putnam,

Assistant, United States Coast and Geodetic Survey, in Charge of Work in The Philippines

THE work of the Coast and Geodetic Survey in the Philippine Islands is at present conducted under a joint arrangement between the national and insular governments, whereby each defrays certain classes of expenditures. It is under the general supervision of the Superintendent at Washington, but the local administration is conducted mainly through a suboffice established at Manila. In all relations with the Philippine government this office acts as a bureau reporting to the Philippine department of commerce and police, in accordance with the act of the Philippine Commission passed September 6, 1901.

An officer of this survey visited the islands during the summer of 1900 to make a preliminary investigation of the need of and conditions for the carrying on the work of the organization. The first survey parties arrived in Manila in December, 1900, and the present office quarters in the Intendencia building were assigned and field parties commenced work in January, 1901. At that time active military operations were in progress throughout the islands and Manila was under martial law. No one

Surveying Party Crossing a River on an Improvised Raft



Landing from an Outrigger through the Surf

was allowed on the streets of the city after 10 o'clock at night without authority, so that it was necessary for the longitude observer to be provided with a pass. For a while the field work was confined to the vicinity of garrisoned posts, but after a few months the general conditions in the islands greatly improved and survey operations have been extended as needed. No serious difficulty has been encountered because of the hostility on the part of the natives, although in instances parties have been in towns that were "shot up." On several occasions the surveying work, and especially the triangulation signals, have aroused the suspicions of over-zealous local officials. In one instance an observer climbing a hill to occupy a triangulation station met the municipal police of the neighboring town coming down the hill carrying the

triangulation signal with its wide, outspreading legs still on it; they were industriously cutting a wide path through the thicket so as to be able to produce this suspicious object intact, evidently believing it a beacon of the insurrectos. They were persuaded to carry it up the hill again.

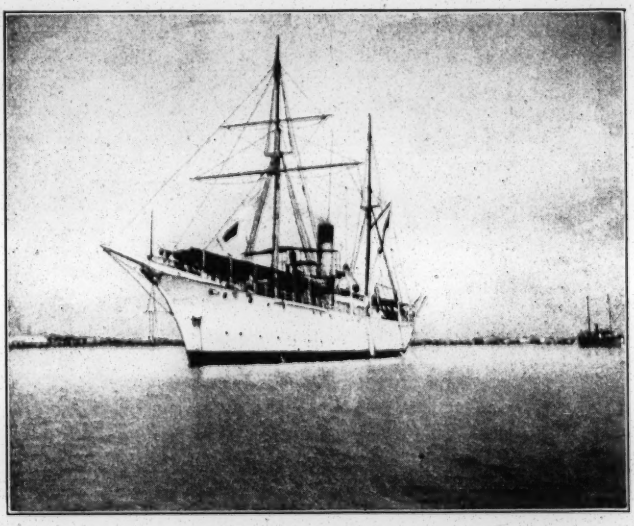
The development of the field work has necessarily been controlled by various conditions, and it has been extended along the lines which appeared most feasible with the means available and most likely to yield results of immediate usefulness.

The wide extension by the Signal Corps of the telegraph system for military purposes suggested the determination of base positions, including telegraphic longitudes and zenith telescope latitudes. It was fortunate that this work was carried out promptly, as with the passing of military necessity many lines have been abandoned. Thirty-six latitudes and thirty-six differences of longitude have been determined, the points being fairly well distributed over the archipelago from the north coast of Luzon to Zamboanga. These stations have all been marked and described for future reference. At most stations a meridian has been laid out or an azimuth measured, and magnetic observations have generally been made.

The surveying steamer *Pathfinder*, under command of J. J. Gilbert, assistant, U. S. Coast and Geodetic Survey, arrived at Manila from Alaska in November, 1901, and has since been continuously at work in the islands, except during intervals when docking or repair work on the vessel has been required.

Harbor surveys at Cebu, Ormoc, and Romblon have been made, and during the past year this vessel has completed important surveys of San Bernardino Strait and Albay Gulf, and of San Pedro Bay and the south coast of Samar, as well as a thorough examination of the much-used passage southwest of Leyte, where a danger had been reported. The *Pathfinder* is a well-equipped, modern survey ship, and carries two steam launches.

A small wooden steamer was purchased in Manila and adapted to survey work. This vessel, the *Research*, has made a number of harbor surveys on the west and southeast coasts of Luzon and on Mindoro and Culion islands, and is at present working on the coast of Negros.



U. S. Coast and Geodetic Steamer *Pathfinder*

Chartered launches have been employed in some cases for hydrographic work, and the survey of Lingayen Gulf by this means has recently been completed. Harbor surveys have been made at a number of other places, using various means.

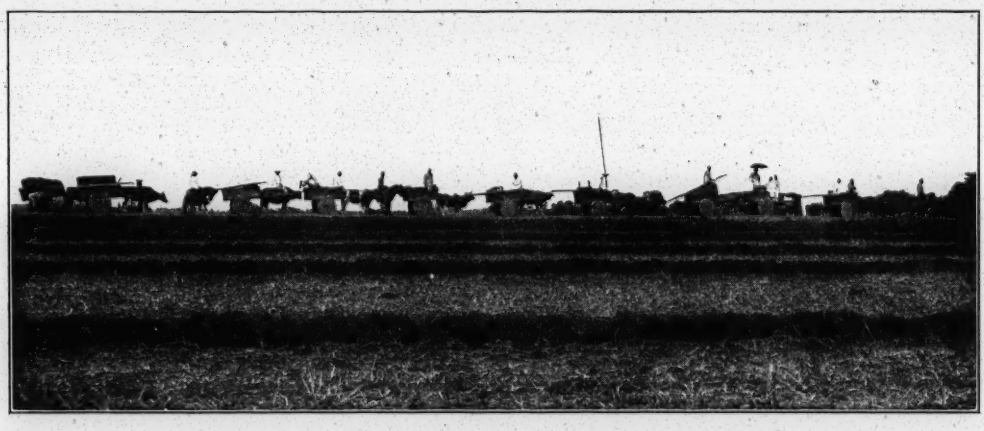
The abrupt coral reefs along many of

the coasts of the archipelago materially increase the difficulty of carrying on hydrographic work.

In connection with the hydrography, tidal observations have been made at 31 places. At Manila an automatic tide-gauge has been maintained for more than two years. The tide staffs are referred to bench-marks. The tide records are used in reducing the soundings and in predicting the tides, to be included in the annual Tide Tables published in Washington.

A continuous triangulation has been carried along the northwest coast of Luzon from Lingayen Gulf to Cape Bojeador, and this is now being extended eastward along the north coast. This triangulation is for the control of the coast line, and extends from the shore to the first line of hills. It is joined to the various astronomical stations and is sufficiently controlled by base lines and observed azimuths. Nearly all the harbor and other survey work is based on triangulation, and is generally connected with one of the astronomical stations, and all the points are marked and described. A triangulation has been carried to the entrance of Manila Bay, which it is proposed to extend to the southward among the islands.

Topographic surveys with the plane-table have been carried out in connection with nearly all the other work, usually executed simultaneously with the triangulation, but controlled by the latter. A scale of $\frac{1}{10000}$ has generally been used for harbor work and $\frac{1}{20000}$ for general coast work, though these have been varied as conditions required. The topography has been confined to the shore line and adjacent towns and highways, with the location of elevations visible from the coast. In the work along the northwest coast of Luzon native ponies were used by the observers, and bull carts for the transportation of instruments. The work progressed satisfactorily under the conditions there found, which were more favorable than in many other districts. The numerous substantial church edifices with which the country is dotted furnish the best of artificial landmarks and are a decided assistance in all parts of the survey work. In some localities few additional signals are necessary for hydrographic or other work.



Triangulation Party Starting Out from Manila

In the office of the Survey in Manila detailed plans for the field parties are

arranged, the distance from Washington rendering this necessary. The records and survey sheets are sent to this office, and preliminary charts are prepared and published by lithography in Manila.

In this office there have also been compiled and published a series of seven pamphlets of Sailing Directions for the Coasts of the Philippine Islands, and from time to time there are published Notices to Mariners, giving new information of immediate importance to navigation, as dangers discovered, changes in aids to navigation, and other corrections to charts.

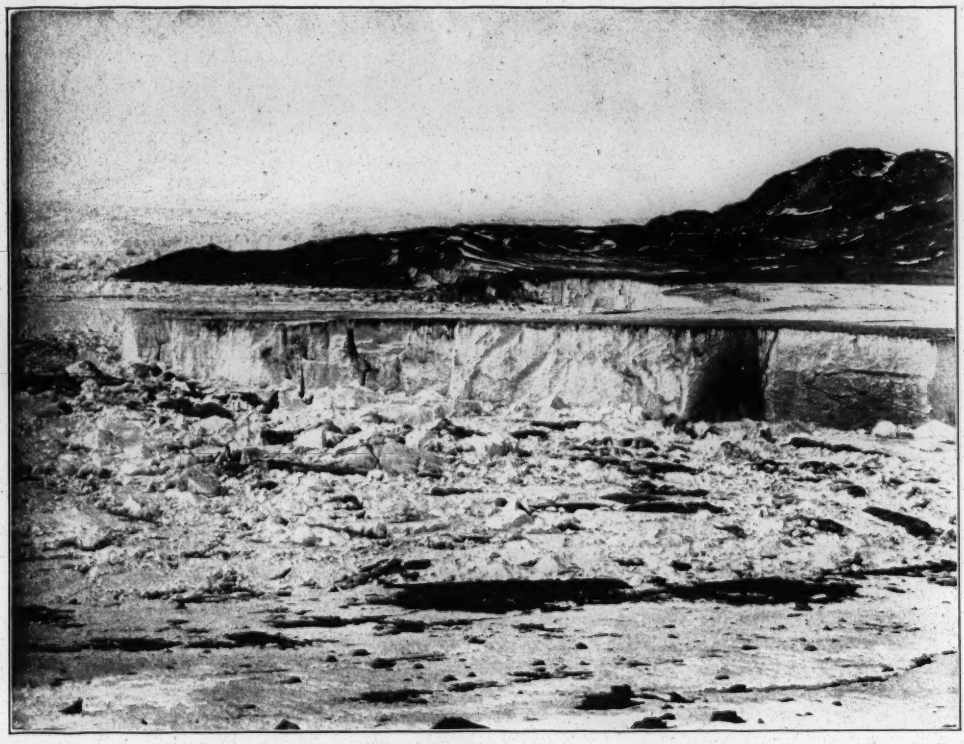
The computations are revised and carried as far as may be needed for immediate use, the soundings are plotted or examined, and the drawings are reduced to the scale required for publication. Besides the American experts in charge of each part of the work, ten Filipino draftsmen and one Filipino computer are employed. The almost entire lack of technical education in the Philippines has been a barrier to testing the ability of the natives in the survey work in the field.

To furnish a knowledge of the coasts and adjacent waters that will be satisfactory to an enlightened nation will require a large amount of coast-survey work in the Philippine Islands. While considerable information exists, a careful examination of it proves that for only limited areas does it approximate completeness. Many parts of the coast have been only roughly sketched. A glance at the map of the islands shows that the natural highways of this region are on the water, so that a large part of the commerce of the islands will always be carried by water. A few geographical facts will emphasize these conditions. The islands have a general coast line of about 11,444 statute miles, or double that of the main part of the United States, while the total area is 115,026 square miles, or less than that of New Mexico. There is a mile of coast line to every 10 miles of area, while in the United States the proportion is 1 to 555. There are nearly 1,700 islands having names and it is possible to count 3,000 islands and islets on the charts. Even the larger land masses are so elongated in figure that no point in any island is more than 60 miles distant from some part of the coast.

MUIR GLACIER

FOR four years it has not been possible for the excursion steamers visiting Glacier Bay to closely approach the Muir Glacier. As that glacier has been the Mecca of many of the Alaska tourists, the failure to see the glacier at close quarters has been a grievous disappointment. During the season of 1899 the conditions were unchanged, and the boats made their entrance into Muir Inlet and landed their passengers as usual, but with the season of 1900 and the following seasons they were able to get no nearer than from five to ten miles below the usual landing. From that distance it could be seen that great changes had occurred in the appearance of the front of the glacier, and that the ice had receded to a considerable extent.

Desiring to know the extent of the changes, on May 5, 1903, Mr Case, a photographer, of Skagway, Alaska, and myself left Skagway for Glacier Bay in an open boat. We followed in the bay, in all probability, close on the track of Professor Muir and Reverend Young when on their exploration trip in 1879. Going through the passages between the Beardslee Islands and keeping near

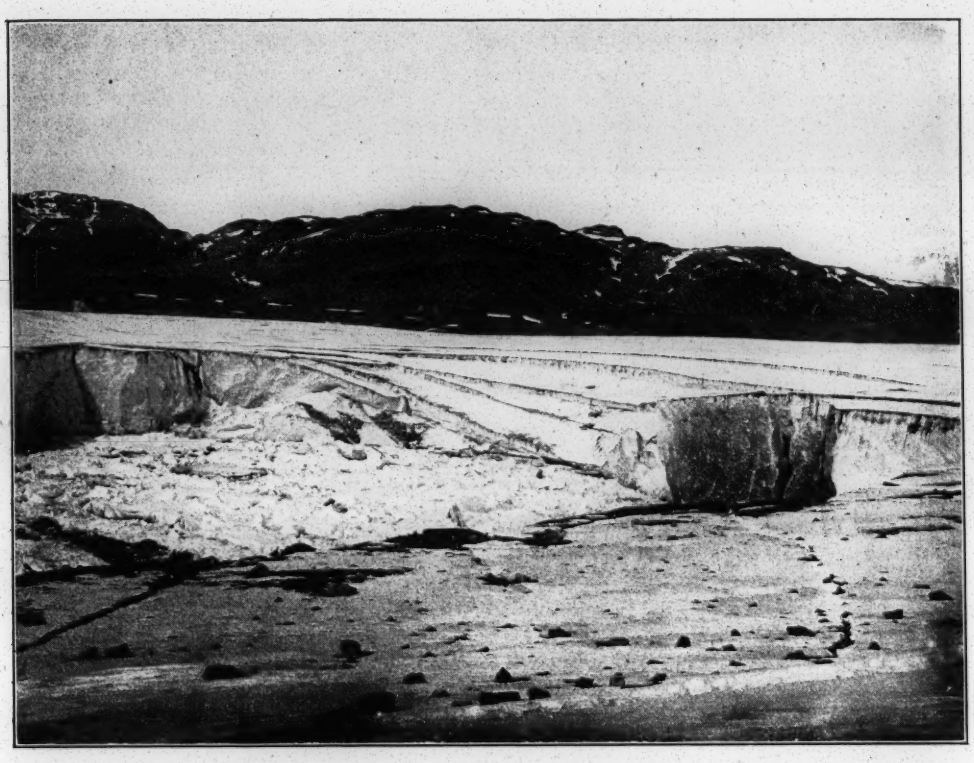


A. Muir Glacier in May, 1903

A and B give a panoramic view of the frontal cliff of the division of the glacier passing east of the nunatak. Beyond the nunatak at the left appears a part of the main or western division

the east shore, we entered Muir Inlet, passed back of the small island, and reached the moraine of the glacier. At this point the ice completely blocked further progress, filling the inlet from shore to shore in a solid mass of bergs, large and small. Landing here, we went up to where a view could be had of the inlet and glacier. From this point the ice in the inlet looked as though so closely packed that, from the island on the eastern shore across to the western shore and up to the front of the glacier, one might cross the inlet on the ice at almost any point. At scarcely any place could any water be seen, and to one not knowing that water extended underneath the ice, it would have been hard to believe it possible. It had the appearance of a great ice-jam in a river, except that the larger bergs were lifted above the mass higher than any jam could raise them. The space of clear water which formerly extended in front of the ice, forming one of its greatest contrasts, was entirely filled.

The glacier had receded until the point of the island in the center of the glacier, shown as being about three miles from the ice-front on the map of the glacier by Professor Reid, in the NATIONAL GEOGRAPHIC MAGAZINE, February, 1892, was clear of ice except such as lay on the water in front of it. The main branch breaks from there to the mountain at the west, and



B. Muir Glacier in May, 1903

the western tributary is entirely separated from it. On the other side of the island, or nunatak, the break of the glacier front extends toward the mountain above the Dirt Glacier in two hollowing curves, leaving a point in the middle extending into the inlet as though resting on a sand-spit or other support. From there it turns west toward the Dirt Glacier and presents an ice-wall of perhaps 100 feet in height or more, nearly to the place the Dirt Glacier enters the inlet. This part of the glacier presents a different front from the main branch. The top of the ice is nearly level, and as it approaches the water it cracks in immense crevasses at varying distances back, and cubical blocks break from it, making much larger bergs than were formerly thrown off by the Muir. Bergs that appeared to us to be fully 75 feet out of the water were seen 10 miles down Glacier Bay.

The Dirt Glacier pushes its black front out into the inlet from the southeast, forming a separate glacier.

This description will enable any one familiar with Professor Reid's map, or any one who has visited the glacier, to understand the marked changes which have occurred.

Judging from the appearance, it is not improbable that the end of the career of the Muir as a tidewater glacier is near at hand.

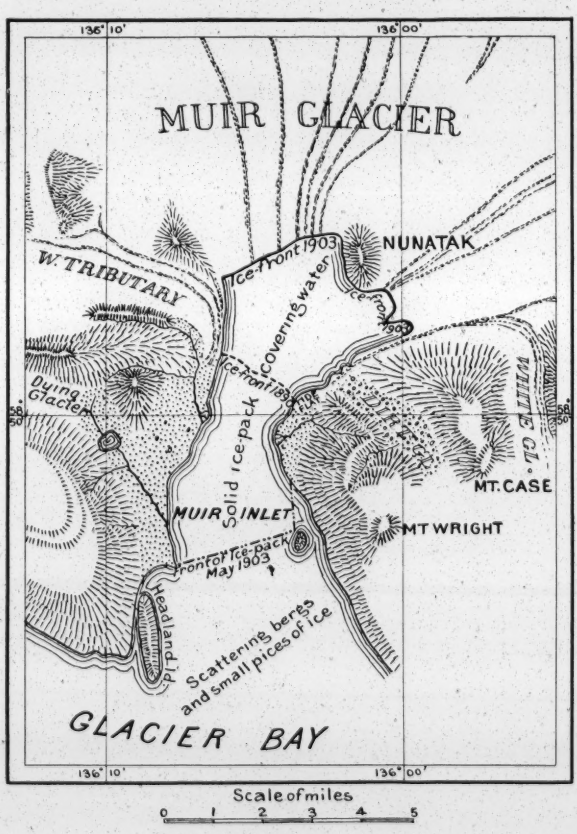
Many attribute the sudden changes to the earthquakes which occurred in

September, 1899. At that time the part of Alaska in which the Muir Glacier is situated was visited by several severe shocks of earthquake. Previous to that the steamers had experienced no great difficulty in landing their passengers within a short distance of the front of the glacier, but during no season since have they been able to get nearer than five to ten miles, owing to the immense quantities of floating ice. Instead of receding a mile in seven years, as has been estimated heretofore, it has drawn back about two and one-half miles since 1899; consequently, to assign the changes to that cause is not at all unreasonable.

I append a sketch, based on Professor Reid's map heretofore referred to, showing changes, and also photographs by Mr Case and myself, showing some of the existing conditions.

C. L. ANDREWS.

Skagway, Alaska.



Sketch Map of Muir Inlet and Front of Muir Glacier, Showing Positions of the Ice Front in 1890 and in May, 1903

The main features are taken from the map published by H. F. Reid in volume IV of the NATIONAL GEOGRAPHIC MAGAZINE. The ice front in 1903 and the data as to the condition of the inlet in that year are by C. L. Andrews.

NOTE BY G. K. GILBERT

THE Muir Glacier is the best known and also one of the most interesting of American glaciers. It is not a narrow river of ice of the ordinary alpine type, but rather a broad lake of ice fed by tributary streams from many directions, and discharging through an outlet valley to Glacier Bay. The bottom of this valley of discharge is below sea-level, so that whatever position in it the glacier front occupies the ice is washed by the water of the ocean. The part of the valley not occupied by the glacier is known as Muir Inlet, and is a branch of Glacier Bay. In 1792, when this part of the coast was mapped by the English navigator, Vancouver, nearly the whole of Glacier Bay was filled with ice, the Muir Glacier being tributary to a broader stream. This broader stream ended in an ice cliff at a point more than 20 miles farther seaward than the present front of Muir Glacier. In 1879 the region was visited by John Muir, who explored Glacier Bay and its various inlets. He found the front of Muir Glacier well within Muir

Inlet, the retreat since the time of Vancouver having been more than 15 miles. In 1886 Rev. G. F. Wright made a study of the glacier, and it was surveyed and more elaborately studied by Prof. H. F. Reid in 1890 and 1892. In 1899 it was visited by the Harriman Expedition, and changes in the outline of the front were recorded in a sketch map by Mr Henry Gannett. Each successive observation up to 1890 showed the retreat of the ice front. Between 1890 and 1892 there was a slight advance, and there was a moderate amount of retreat before 1899. The history of the locality since 1899, as set forth in Mr Andrews's letter, indicates that some very important change was made by the earthquake which occurred a few months after the visit of the Harriman Expedition. As the amount of ice thrown into the inlet was so great that approach by water is not yet possible, it is probable that the greater part, or perhaps the whole, of the falling away of the glacier front took place suddenly and as a consequence of the earthquake. Professor Reid's map shows two nunataks, or islands of rock, projecting above the glacier a few miles back from the front. The summits of these nunataks were used by him as topographic stations, and they were afterward occupied for the same purpose by Mr Gannett. I also, as a member of the Harriman Expedition, visited them in 1899, and noted that the portion of the glacier lying between them and the ice front was at that time practically stagnant. The portion between them and the east wall of the basin seemed also to be nearly motionless, but there was evidence of a strong current west of the nunataks. That which has since broken away includes portions of both the inactive and the active divisions of the glacier, and the maps and photographs suggest that the ice in the vicinity of the nunataks has suffered loss in depth as well as area. Where Reid mapped two small nunataks, Gannett found two of larger area, and Andrews indicates a single one, including the positions of both those observed by Reid. The retreat of the ice front has extended practically to the face of the confluent nunatak, though a remnant of ice appears to cling to the rock, forming a terrace about its seaward slope.

THE GRAPE-GROWING INDUSTRY IN THE UNITED STATES

THE cultivation of grapes for the market, for raisins, and to make wine has become an important business of the United States during recent years. Two hundred million dollars of capital are invested in this and dependent industries. California supplies the people of the country with practically all the raisins that they eat, 100,000,000 pounds, and the same state, with New York and Ohio, produces annually 24,000,000 gallons of wine. The annual grape crop, before any of the grapes are changed to wine or raisins, reaches $15,000,000 in value and nearly 750,000 tons in weight.

The early settlers of the Atlantic coast found wild vines everywhere, but their attempts to start vineyards in the East failed miserably, as they tried to grow varieties imported from Europe. It was not until they began to experiment with some of the wild varieties growing so luxuriantly on the coast that they had any success.

About 1824 Mr John Adlum, of Georgetown, D. C., obtained the well-known Catawba grape by improving a

From George C. Husmann, U. S. Department of Agriculture

Picking Grapes in California

California produces about 22,000,000 gallons of dry and sweet wine yearly. The California Wine Association, at its own wineries in 1902 crushed 150,000 tons of grapes and at its leased wineries enough more to make 225,000 tons. In the fall of 1902 the association paid out in cash over $5,000,000 for grapes.

From George C. Husmann, U. S. Department of Agriculture

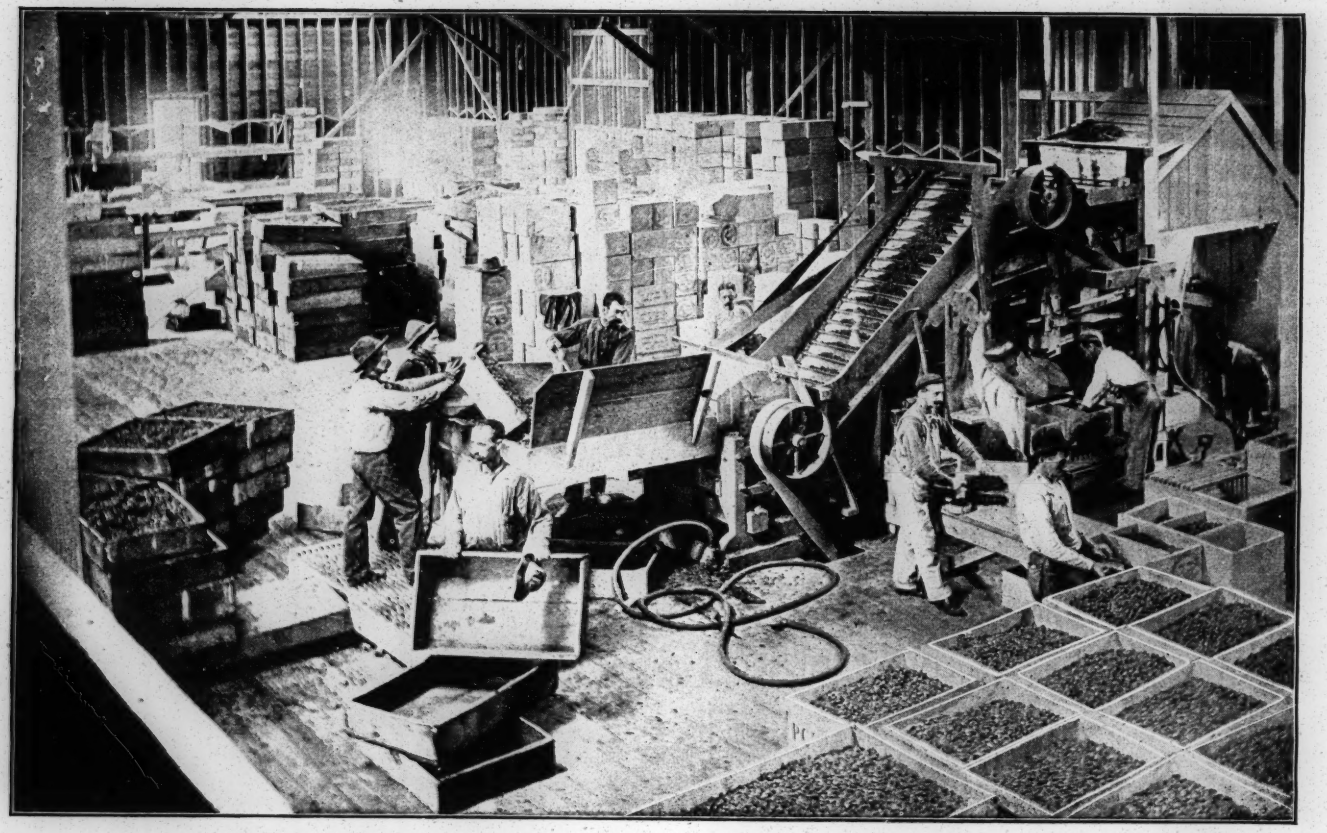
Picking Raisin Grapes in California

It takes from 3 to 4 pounds of grapes to make one pound of raisins. Frequently it rains enough in November to cause considerable damage to partially dried raisins and grapes. It is then that the Japanese laborers watch the predictions of the Weather Bureau, and when rain is indicated ask as high as 50 and 75 cents an hour for turning and covering the trays of raisins that are out in the vineyards. So familiar has this practice become that the school children who are large enough get excused from school for the work. In fact, the labor question is one of the most serious problems the growers have to contend with. The Chinese and Japanese laborers (especially the Japanese) control the situation, and make from $2 to $3.50 and even as high as $4 per day picking grapes.

From George C. Husmann, U. S. Department of Agriculture

Drying Seedless Raisins in California

The average time of drying and curing a tray of raisins is about three weeks. Some of the larger growers, in order not to run so much risk in drying on account of rain and to save time in handling the crop, have curing houses, where the curing is finished after having been partially done outside.



From George C. Husmann, U. S. Department of Agriculture

Stemming Raisins in California

California produces 100,000,000 pounds of raisins yearly. These supply the American people with practically all they want. We now import only six million pounds annually, although as recently as 1885 it was necessary to import 53,000,000 pounds from Spain and Greece.

From George C. Husmann, U. S. Department of Agriculture

Packing Raisins in Layers in California

wild American grape. He was exceedingly elated with his discovery, and in a letter to a friend says that "in bringing this grape into public notice I have rendered my country a greater service than I would have done had I paid the national debt." Though the national debt was then $90,000,000, Mr Adlum probably did not exaggerate the value of his discovery.

Twenty years later, in 1844, Mr Ephraim Wales Bull, of Concord, Mass., obtained the famous Concord grape from the seed of another wild variety. The Concord has since become the most widely known, most generally planted, and for all purposes the best American grape yet introduced. Nine-tenths of the great crop of 85,000 tons of grapes from the Chautauqua grape belt on Lake Erie, in 1900, were Concords. The first Concord vine, from which stock the millions of vines of this variety have come, still lives in the garden of Mr Bull's cottage.

In 1830 there were 88 varieties of American vines known. Today there are at least 1,000.

In California the Mission fathers succeeded at an early date in growing a European grape for their own use. They had but one variety, which is still largely grown, and is known as the Mission. The Mission vine planted at Montecito, Cal., in 1795, was exhibited at the Centennial Exposition in Philadelphia. Some of the choicest European varieties have since been introduced and have thriven in their new home.

Mr George C. Husmann, of the Department of Agriculture, has recently published an exceedingly valuable paper on "Grape, Raisin and Wine Production in the United States," from which these facts are derived.*

In the United States there are two distinct grape-producing sections—one

* Year Book of the Department of Agriculture, 1902, pp. 407–420.

east of the Rocky Mountains, where the American varieties are largely and profitably grown; the other in California, where the foreign or Vinifera varieties have found a congenial home.

To the late Senator Leland Stanford, founder of the Leland Stanford Junior University, belongs the distinction of having had the largest vineyard in the world, comprising nearly 5,000 acres and being over 7 miles long. The wineries on the place cover more than 6 acres of roof surface, and during the years Mr Husmann had charge of them from 2½ million to 3 million gallons of wine were made annually, from 400 to 850 tons of grapes being crushed daily. Throughout California there are a number of vineyards of 500 acres each.

At Asti the Italian-Swiss colony has 1,700 acres in bearing vineyards. On the place are extensive wineries, with the largest wine vat of the world, holding 500,000 gallons. Near Cucamonga the Italian Vineyard Company has, during the last three years, planted nearly 2,000 acres in one field. The Riverside Vineyard Company during the same time planted 2,500 acres in one vineyard.

The amount of wine made in the United States is, however, very small compared to that produced in the countries of Europe. Even Turkey, whose Mohammedan population drink little wine, produces nearly twice as much wine as the United States.

In 1901 France produced of wines 1,523,233,200 gallons; Italy, 1,013,760,000; Spain, 520,080,000; Portugal, 155,760,000; Austria, 116,160,000; Roumania, 87,120,000; Chile, 85,120,000; Russia, 76,560,000; Bulgaria, 73,920,000; Germany, 60,720,000; Argentina, 55,440,000; Turkey, 50,160,000; Greece, 32,300,000; Switzerland, 31,680,000; United States, 29,500,000, and Servia, 23,760,000 gallons. The industry in the United States is as yet in its infancy. A beginning has just been made in a commercial and business-like manner to improve methods and expand markets. California has produced and sold annually the last ten years an average of 20 million gallons of wine, 2 million gallons of brandy, and 80 million pounds of raisins. Her wines and brandies have taken high honors at all important expositions, including that at Paris in 1900, and they are rapidly finding their way into all the principal markets of the world.

So far the raisin industry of this country has only supplied the small home demand of 100 million pounds, whereas the present population, were it to consume as much per capita as some other countries, say Great Britain, would now use 400 million pounds annually, not to say anything of extending markets and exporting to other countries.

When it is considered that France in 1901 produced 1,523,233,200 gallons of wine, while this country produced 29,500,000 gallons, and that the Golden State alone has a grape and wine producing area almost equal to the whole of France, some idea can be formed of the great possibilities of this important industry.

PRECIOUS STONES

THE United States can supply all the wants of its people for coal, iron, copper, petroleum, and all the useful minerals; gold and silver also are found in generous quantities; but of precious stones, the diamond, the ruby, the emerald, the topaz, etc., it has practically none, except what it has bought abroad. In 1902 we paid $25,000,000 to foreign countries for precious stones

that we imported, while during that year precious stones of the value of only $338,000 were found within our borders. These were principally sapphires from Montana, turquoises from New Mexico, Arizona, Nevada, and California, and tourmalines and chrysoprases from California.

The United States Geological Survey has just published a report by Mr George F. Kunz on "The Production of Precious Stones in 1902,"* which contains much interesting information as to the origin of the different stones.

Nearly all the diamonds come from the Kimberley mines.

The South African mines have recovered from the set-back of the Boer war, and apparently have an inexhaustible supply of diamonds. In the various mines a total of over 40,000,000 loads of blue or diamantiferous ground is blocked out, meaning probably more than 10,000,000 carats of diamonds. The largest pile of diamonds ever brought together was collected at the De Beers mine in South Africa in July, 1900. The directors wanted to know the quantity of diamonds necessary to fill a certain measure. Diamonds of all kinds were put in just as mined, and it was thus ascertained that a cubic meter of diamonds weighs 11,976,000 carats and has an approximate value of about $76,000,000. Up to the present time the Kimberley mines have produced more than $500,000,000 worth of uncut diamonds.

The number of diamonds from Brazil has fallen considerably during the last several years, because of the crude and unsystematic methods of hunting for them. Some 5,000 people are engaged in diamond mining there, but their tools are the commonest—a hoe, a crowbar, an iron hook on the end of a pole, or a hammer and two basins for washing the gravel. The accompanying illustrations show two remarkable carbons from Brazil found on one claim—the first in 1894 and the second in 1901. The carbons are split into many pieces and used for diamond drills. The present output of 2,500 carats of carbons a month cannot supply the demand for them for mining and drilling machinery. The price per carat demanded by the miners in the field has jumped to $11 and $11.20 for carbons, which is more than is paid for average uncut diamonds.

A new diamond field is being exploited in southwestern Borneo, where diamonds have long been known to exist. In the region of the Landak River, near the mouth of the Soran River, a piece of so-called serpentine has been obtained which incloses a diamond apparently in its true matrix. The Rajahs of Panembohan and Pongerans possess an immense belt studded with diamonds, said to be from this district, one stone weighing 67 carats. It is a peculiar belief of the natives that the gold and diamonds in the earth are a sort of bank, and should be worked only when they themselves need money, since they believe that gold and diamonds are always there when they desire them. The great Borneo diamond of Mattam, said to weigh 367 carats, is believed to be from this same region.

India, so long renowned in history and tradition as the source of gems, produced in 1902 no diamonds and no precious stones, with the exception of considerable numbers of rubies mined in Upper Burma. The leading gem dealers of Paris and Amsterdam have agents at Mandalay who buy the rubies directly from the Shans. The finest rubies go to Paris.

In examining rubies the Shans never use artificial light, holding that full sunlight alone can bring out perfectly

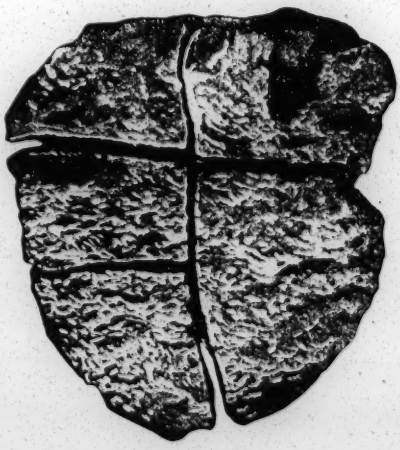
*The Production of Precious Stones in 1902. By George F. Kunz. Extract from mineral resources of the United States, calendar year 1902: David T. Day, Chief of Division of Mining and Mineral Resources. Washington: Government Printing Office. 1903.

From George F. Kunz, U. S. Geological Survey

The Largest Piece of Carbon Ever Found. Actual Size

The carbon was found in Brazil in 1894. It weighed 3,078 carats or 20.3 troy ounces. The finder sold it for $16,000 to a speculator, who resold it for $32,000. After it had been broken into pieces for use as a diamond drill its value was about $130,815.

1

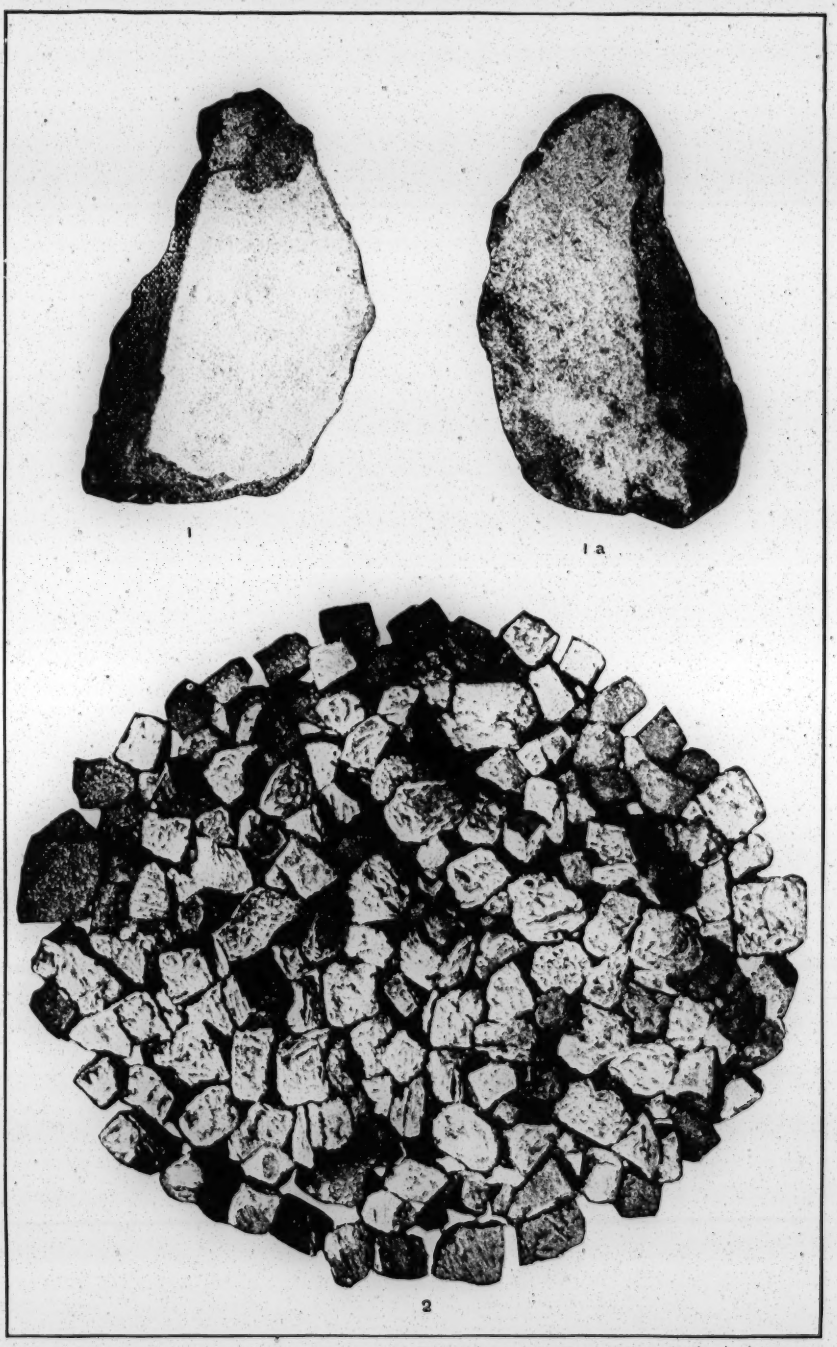


2

From George F. Kunz, U. S. Geological Survey

Process of Breaking the Third Largest Piece of Carbon Ever Found. Weight, 750½ Carats; Value, $23,600. Found in Brazil, 1901

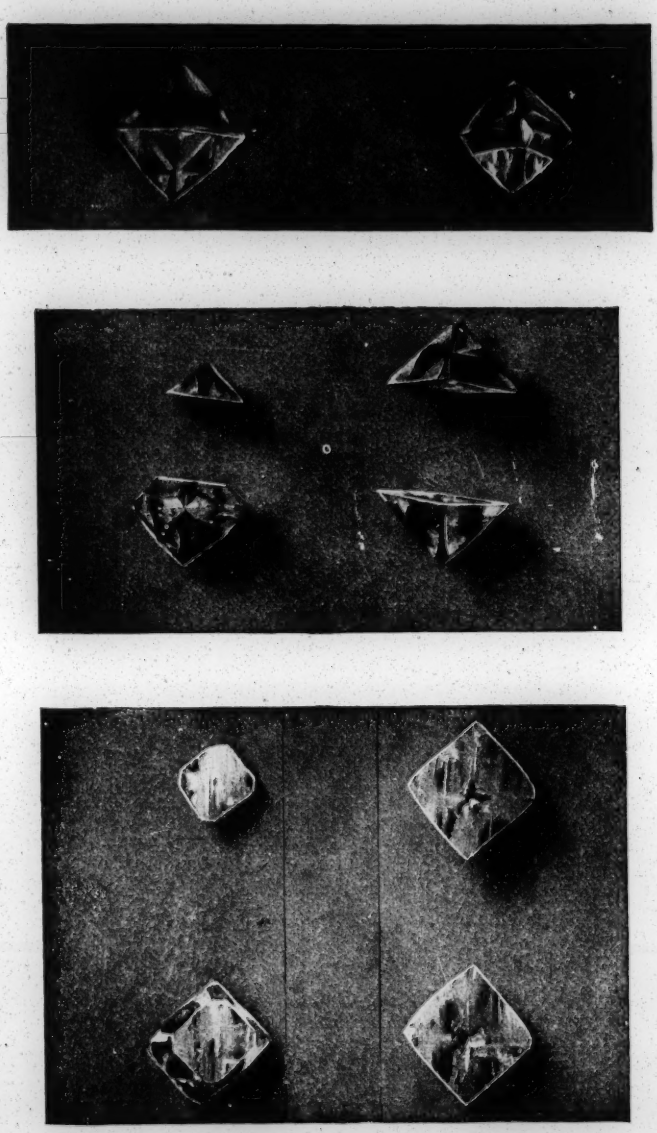
1. Outer half of the piece, showing a break diagonally across it. 2. Reverse (inner) side of 1, showing three breaks, making five pieces of the half of the carbon



From George F. Kunz, U. S. Geological Survey

The Carbon Shown on the Opposite Page as Finally Broken into Pieces for Drills

1, 1*a*. Inner sides of upper part of the carbon shown as Fig. 2 in the preceding illustration. 2. The entire piece of carbon broken into pieces weighing from three to four carats each, the sizes generally used for diamond drills.



From George F. Kunz, U. S. Geological Survey

Diamond Sawing by a Process Recently Invented by an American

The diamond is held firmly and very steadily under pressure against a rapidly revolving disk of sheet iron or "phosphor" bronze. The wheels are much like those used in sawing thin sections for microscopic rock sections or for cutting jade, rock crystal, and other hard stones. It is claimed that in thus dividing an octahedron at the center or girdle as little as 2 per cent of the weight of the crystal is lost—a great saving of material. As evidencing the wonderfully keen responsive business acumen which has always characterized the "rough" syndicate, the price of all rough diamonds that could be improved or advanced in value by such sawing was immediately advanced when the process became known.

the color and brilliancy of the gems. Sales must therefore take place between the hours of 9 and 3, and the sky must be clear..

The purchaser, placed near a window, has before him a large copper plate. The sellers come to him one by one, and each empties upon the plate his little bag of rubies.

The bright copper plate has a curious use. The sunlight reflected from it through the stones brings out a color effect with true rubies different from that with red spinels and tourmalines, which are thus easily separated.

The buyer and seller then go through a very peculiar method of bargaining by signs, or rather grips, in perfect silence. After agreeing on the fairness of the classifications, they join their right hands, covered with a handkerchief or a flap of a garment, and by grasps and pressures, mutually understood among all these dealers, they make, modify, and accept proposals. The hands are then brought out, and the prices are recorded.

The larger single stones are valued according to color and shape for cutting, the very fine ones bringing high prices. A ruby of 36½ carats from the Mogok mine some years ago brought 90,000 rupees ($30,000) at Calcutta.

Cutting is an important industry at Mandalay, and the Burmese workmen have remarkable skill, especially in avoiding loss in weight. European cutting they consider very wasteful, and at Mandalay a man would not be employed who sacrificed more than one-fourth of a ruby, while at Antwerp a loss of two-thirds is not uncommon. The tools are extremely simple. The stone is first shaped with a small steel chisel and wooden mallet, as far as possible, according to its cleavage. The facets are then ground and polished on a copper wheel with ruby dust, the stone being held with wax or lac on a curved piece of ox horn. A month or six weeks may be occupied in cutting and polishing a ruby of one carat.

The pale stones, cut rounded (cabochon) with a concave base, are much used for ornamental work, especially upon gold vessels. The luster of the gold beneath appears to enrich and darken the ruby and give it the true pigeon's-blood color.

Agates, amethysts, rock crystal, and golden topazes are shipped in great quantities from Brazil. Almost all of them go to Idar and Oberstein, in Germany, where they are cut into ornaments. Last year 200,000 pounds of agate and six tons of rock crystal were cut into seals, paperweights, and faceted stones. One wonderful geode yielded over 40,000 pounds of amethyst.

A great quantity of sapphire of a very dark blue, almost black, color, with a greenish tint, and occasionally entirely green, was imported from Australia. The tourmaline, principally the red (rubellite) and also the aquamarine from Brazil, have been sought for, and considerable quantities of both have been sold at Idar.

It is interesting to note the increasing variety of ornamental and semi-precious stones now being brought into use, and particularly the introduction of jade.

This beautiful stone has from prehistoric times been the especial favorite of uncivilized or semi-civilized peoples, and in China, Japan, and India it has yielded the choicest objects of oriental art. At the Paris Exposition of 1900 a remarkable exhibit was made of Siberian jade wrought by European artists, and now the Oceanic jade of New Zealand, long prized and carved by the Maoris, is becoming immensely popular with the civilized world.

Great bowlders of it have recently been discovered in New Zealand, in the river beds, from one of which two panels, translucent and of a rich pure green color, were cut, which were over one

yard long, two-thirds of a yard wide, and only one-eighth of an inch thick. Nearly all the jade of New Zealand was sent to Germany and there cut into stones for rings, scarf-pins, studs, and for ordinary jewelry purposes, such as those for which sard and agate have heretofore been used.

The diamond syndicate, composed of the South African mine owners, manage the sale of their diamonds very shrewdly. A purchaser must buy not only the variety of diamond he wants, but also all the other varieties from the mines. The syndicate sells its diamonds in parcels or series; each parcel is made up of the different varieties of diamonds in the proportion in which each diamond is found. In this way the unpopular varieties are disposed of as quickly as the popular ones.

The diamond-cutting industry in the United States has advanced very rapidly during recent years. American diamond-cutters would now be able to cut all the diamonds for this country if they could get enough rough diamonds. As it is, the rough diamonds sent over supply only one-half of the demand.

The American cutters have invented a number of new mechanical labor-saving devices, which have given them a great advantage over the European cutters, where diamond cutting is done by the ancestral "rule of thumb" handed down from father to son.

NOTES ON PANAMA AND COLOMBIA

IT is supposed by some that Panama derived its name from the native word for butterfly. Explorers of the interior tell of swarms of butterflies which at times rise on the slopes of the mountains in dense clouds, darkening the sunshine. Others maintain that the name is from an Indian word meaning abounding in fish.

The Republic of Panama is believed to have about 300,000 people, living in towns and hamlets. It extends east and west for about 450 miles, with an average breadth of 70 miles from sea to sea. Its area is about 31,500 square miles. Thus the population of the state about equals that of Washington, D. C., while its area is a little greater than the area of South Carolina. The commerce of Panama amounts to $3,000,000 per annum. These figures are supplied by the Bureau of Statistics of the Department of Commerce and Labor, and are from reports of the United States consuls at Panama and Colon, which have just been received by the Bureau and are not yet published.

The principal ports are Panama, on the Pacific coast, and Colon, on the Atlantic side, and these ports are visited annually by more than one thousand vessels, which land over one million tons of merchandise and nearly one hundred thousand passengers, chiefly for transfer over the Panama Railway, 47 miles in length, connecting the Pacific port of Panama with the Atlantic port of Colon.

Colon, sometimes called Aspinwall, has a population of about three thousand persons. It was named in honor of Columbus, who discovered the bay in 1502. The city of Panama has a population of about twenty-five thousand. It was founded in 1519, burned in 1671, and rebuilt in 1673. During the sixteenth and seventeenth centuries Panama was one of the wealthiest of the Spanish towns in the New World, as all the plunder from the Pacific coast passed through the city. It "had eight monasteries, a cathedral, and two churches, a fine hospital, 200 richly furnished houses, nearly 5,000 houses of humbler sort, a Genoese chamber of commerce,

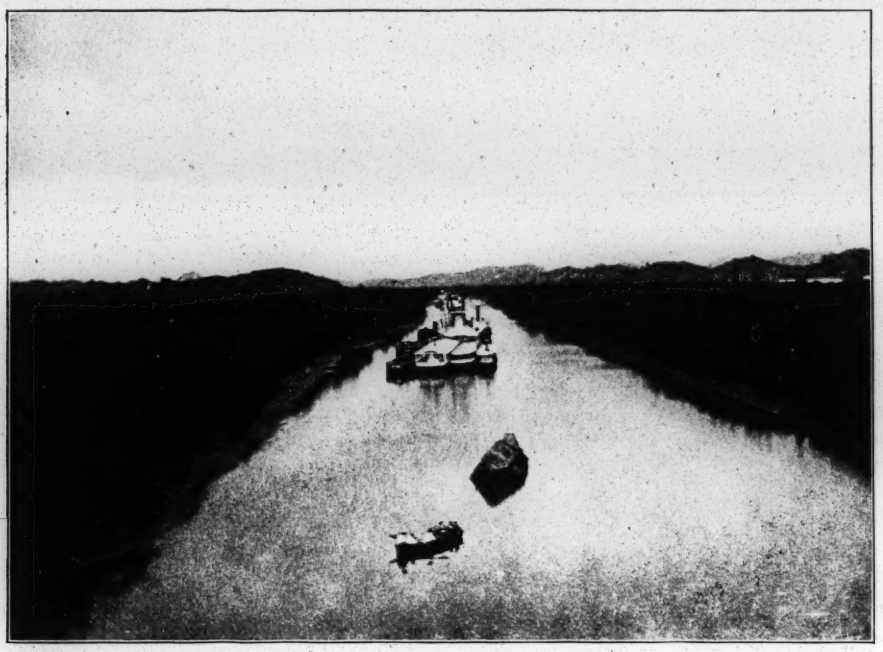


Photo by Robert T. Hill

An Uncompleted Section of the Panama Canal

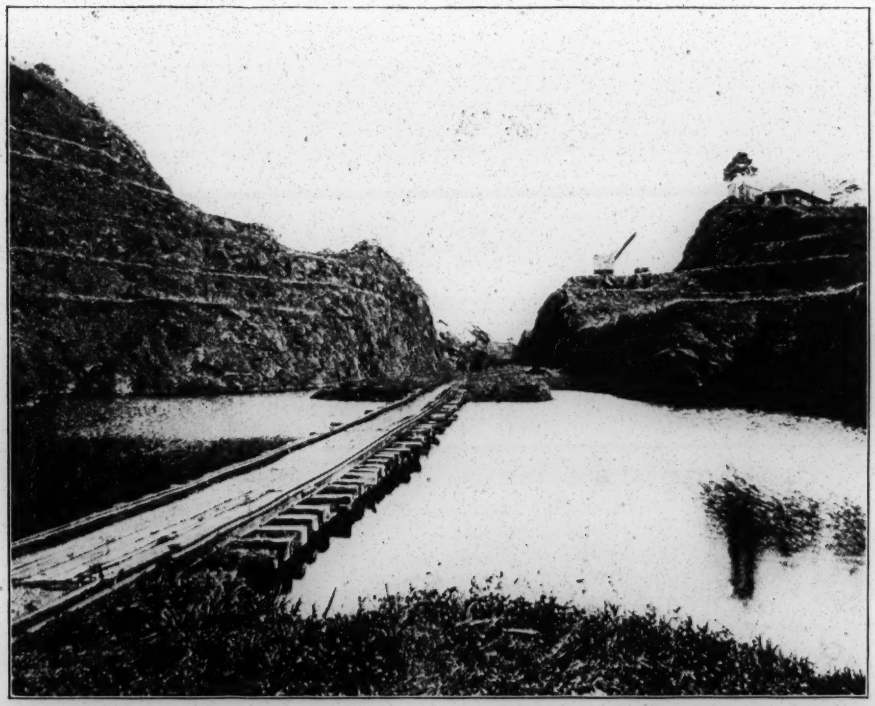


Photo by Robert T. Hill

Canal Cutting Through Massive Basaltic Rock

Photo by Robert T. Hill

Panama Bay. The Island of Toboga, Famous for its Delicious Pineapples

Photo by Robert T. Hill

Washerwomen—Isthmus of Panama

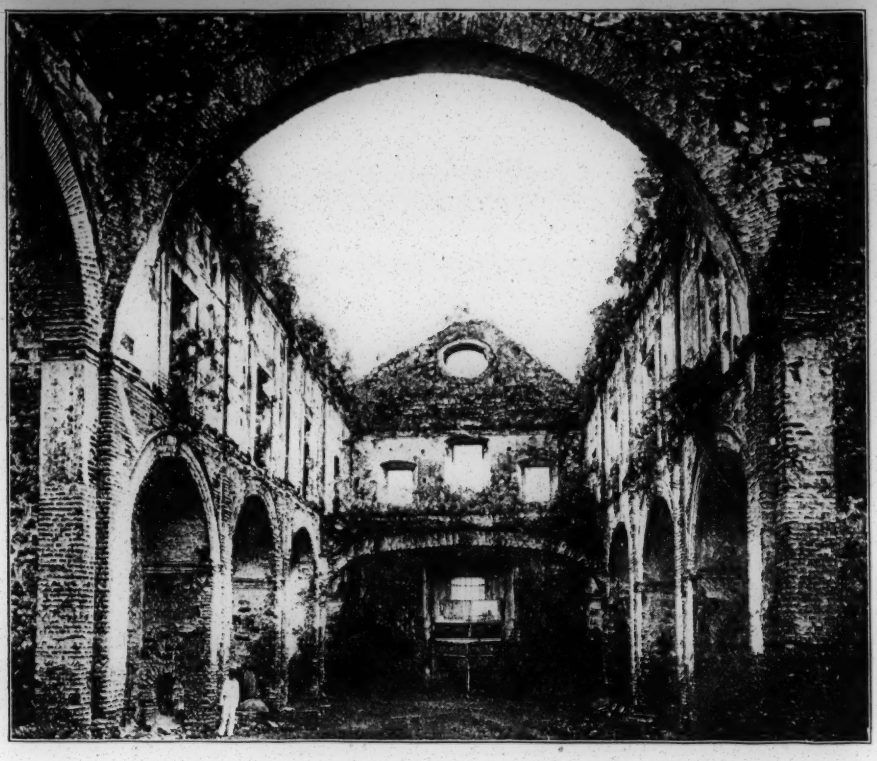


Photo by Robert T. Hill

Panama. Interior of Ruins of Old Cathedral

In the back of the picture will be seen a brick arch of about 30 feet span and less than 4 feet spring. The preservation of this arch testifies to the freedom of this region from serious earthquake disturbances.

Photo by Robert T. Hill

Panama. This Tower Alone Remains to Mark the Site of the Great City befor it was Sacked by Sir Henry Morgan

and 200 warehouses, and was, after three weeks of rapine and murder, burned February 24, 1671, by Morgan's buccaneers, who carried off 175 laden mules and more than 600 prisoners."* Colon is of much more recent date, having been founded in 1855.

The population, which, as already indicated, amounts in number to about three hundred thousand, is composed of various elements—Spanish, Indian, Negro, and a limited number of persons from the European countries and the United States, especially those engaged in commerce and transportation and the operation of the Panama Railway. Since the abolition of slavery in Jamaica a considerable number of blacks and mulattoes have settled on the Isthmus as small dealers and farmers, and in some villages on the Atlantic side they are said to be in the majority, and as a result the English language is much in use, especially on the Atlantic side. Some of the native population have retained their customs, speech, and physical type, especially those in the western part of the province, and claim to be descendants of the natives found in that section by the Spaniards when they discovered and conquered the country.

Of the commerce of Panama, the United States supplies a larger share than any other country. The importations at the port of Colon during the fiscal year ended June 30, 1903, as shown by the report of the United States consul, amounted to $952,684, of which $614,179 was from the United States, $119,086 from France, $118,322 from England, $76,386 from Germany. The exports to the United States from Colon in 1903 amounted to $173,370, of which $75,432 was bananas, $54,960 cocoanuts, $12,472 turtle shells, $9,400 ivory nuts, $6,460 hides, and $5,924 coffee.

From the port of Panama the exports to the United States in the fiscal year 1903 amounted to $193,342, of which $56,767 was hides, $49,974 India rubber, $27,805 cocobolo nuts, $16,598 ivory nuts, $13,372 deerskins, and $6,908 coffee. The consul at Panama states that the imported articles come mostly from England, Germany, France, Italy, and the United States, but gives no statistics of the imports.

Panama is connected with San Francisco by a weekly steamer schedule operated by the Pacific Mail Steamship Company, and with Valparaiso by a weekly steamer schedule operated by the Pacific Steam Navigation Company and South American Steamship Company. Two passenger and two freight trains leave Panama daily for Colon, and Colon daily for Panama. The time for passenger trains over the 47 miles of railway is three hours.

From Panama there is one cable line north to American ports and one to the south. The actual time consumed in communicating with the United States and receiving an answer is stated by the consul to be usually about four hours. There are also lines from Colon to the United States and Europe.

The money of the country is silver, the rate of exchange having averaged during the past year about 150 per cent.

The climate of the isthmus of Panama has proven most deadly in the past. Even the tough negroes imported from Jamaica have quickly succumbed to the marsh fevers and tropical diseases of the country. The excessive death rate has been principally due, however, to an utter disregard of sanitary laws. A sensible and efficient administration will be able to improve conditions and to make the lives of all on the Isthmus safer.

Along the route of the canal the country is accurately surveyed, but there are large sections beyond which are unexplored.

COLOMBIA

Colombia has more than ten times the population of Panama. The last census

*Travels of Pedro de Cieza de Leon, Hakluyt Society, 1864.

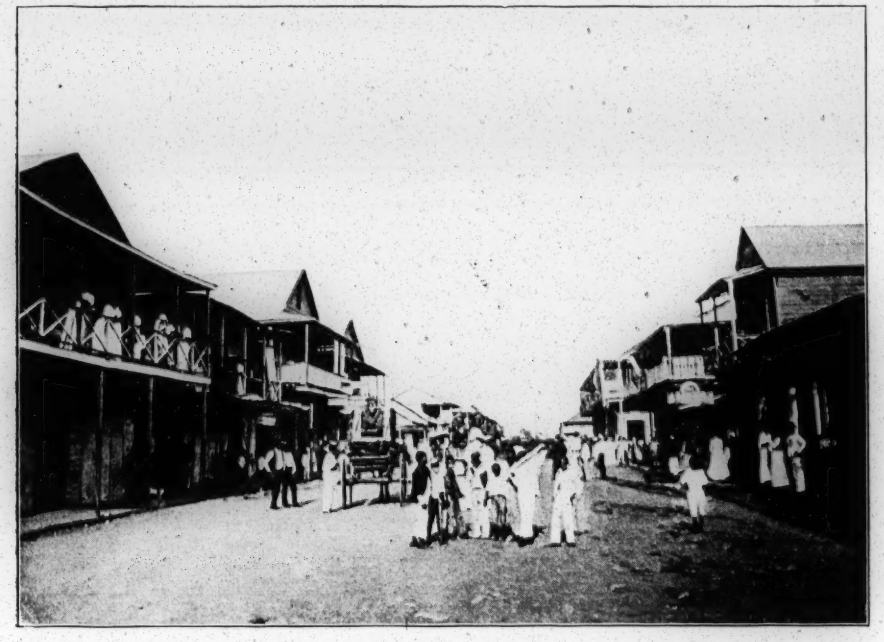


Photo by Robert T. Hill

A Street of Colon

Photo by Robert T. Hill

Colon—Driveway of Christofer Colon, the Canal Suburb

The ground is made from débris of the Canal dumped into the bay

Photo by Robert T. Hill

Colon. Residence of the Superintendent of the Panama Railway Company at the Entrance of Limon Bay

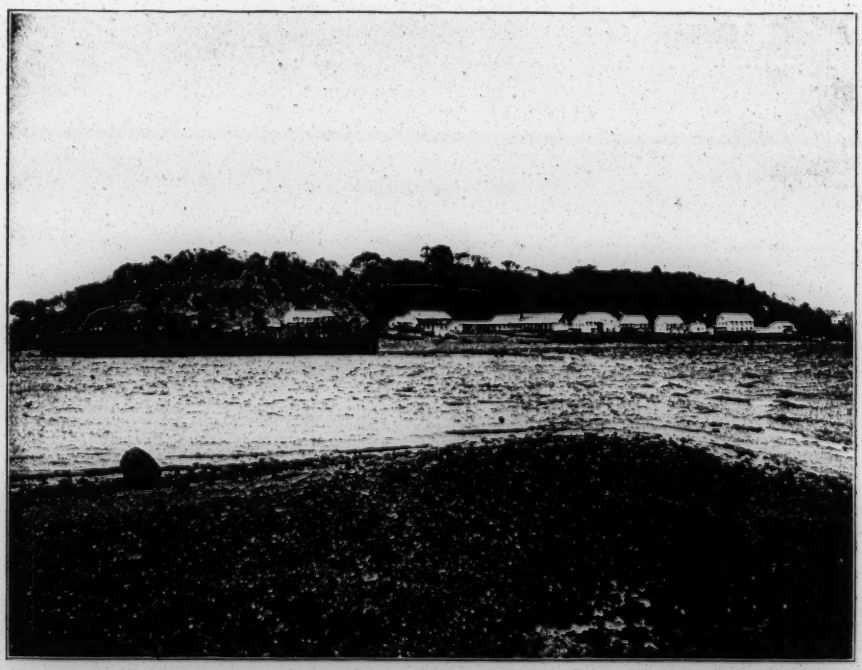


Photo by Robert T. Hill

Panama Bay. The Island of Naos, Terminus of the Pacific Mail Line

was taken 32 years ago; but an official estimate made in 1881 gave her about 3,600,000, not including the people of Panama. Colombia has no army to speak of, no ships, no money, only a few miles of railway, and hence no means of sending a good force against Panama.

Bogota, the capital, is called the Athens of South America, and has a population of 125,000. The national university is located in the city and there is a valuable library of 50,000 volumes, an observatory, a picture gallery, and several learned institutions.

An intending visitor to Bogota is landed at Barranquilla, at the mouth of the Magdalena River; thence he proceeds by steamer up the river for 592½ miles to Honda, then by rail 22 miles to La Dorada, then by mules 45 miles to Facatativa, and thence by rail 24 miles, when he finally reaches the Colombian capital.

Colombia, exclusive of Panama, is as large as the two states of California and Texas combined. Three high mountain ranges cross the republic from north to south, making high table-lands between, where the days the year round are scarcely hotter than those of a temperate zone. On the Bogota table-land the glass oscillates between 50° and 78° Fahr., while the annual rainfall rarely exceeds 45 inches. In the lowlands, of course, the tropical sun beats down with an intensity that makes those sections uninhabitable by the white man.

The people are a mixture of races. At the time of the Spanish conquest the population of Colombia was estimated at eight million. Wholesale butcheries and enslavement in the mines reduced the number in a few generations to less than a million. Most of the natives were too helpless to resist, but "some retaliated and in the Antioquia district poisoned the salt springs so effectually that they remain poisoned to this day." The present Colombian nationality is a fusion in varying proportions of the aborigines with the whites from various parts of Spain, including a considerable number of baptized Jews. This Hebrew element is quite noticeable, especially in the province of Antioquia, which is the wealthiest and most prosperous of the departments of Colombia. There is also a considerable African element in the population.

Colombia has great wealth lying untouched on her plains and in her forests and mountains. Dr A. H. Keane describes her resources in the following glowing terms:*

"So varied and abundant are its natural resources, both above and below ground, that, under a firm and enlightened administration, Colombia, despite the insalubrious climate of many districts, might soon become one of the most prosperous regions in the world. It supplies nearly all the platinum as well as the very finest emeralds brought to the European market, while gold-bearing reefs and washings occur almost everywhere, the total annual yield being about £650,000 and the yield of gold and silver since the discovery nearly £150,000,000. In 1891 as many as 4,960 mines of all kinds were open, including 3,398, 794, and 571 of gold in the three departments of Antioquia, Tolima, and Cauca respectively, besides 32 of emeralds, 14 of cinnabar, 7 of manganese, and several of platinum, silver, lead, mercury, iron, coal, and salt. Extensive coal-fields and reservoirs of petroleum occur in several districts, so that few regions can compare with Colombia for the astonishing variety of its underground products. Scarcely less varied are those of its forests and cultivated lands, including coffee, cocoa, tobacco, sugar, vegetable ivory, rubber, dye-woods, plantains, wheat, and maize; but at present only a small part of the country is under tillage, and the development of its agricultural resources is greatly retarded by the lack of good communications."

*Central and South America. By A. H. Keane. Vol. I, p. 152.

Photo by Robert T. Hill

Houses of the Talamancan Indians

The Talamancans are a tribe of uncivilized Indians living on the borders of Panama and Colombia. They are aborigines, and are practically as wild today as in the time of Columbus

Photo by Robert T. Hill

Typical Vegetation of the Isthmus of Panama. Two Talamancans in the Foreground

THE U. S. SIGNAL CORPS

THE Alaskan telegraph system has been completed by the U. S. Signal Corps. It is now possible to send messages by wire to Valdes, Fort Michael, and to stations along the Yukon River. At present these messages must pass over Canadian lines to the international boundary near Fort Egbert, whence they are carried by the U. S. military lines to their Alaskan destination. A cable has been laid from Sitka to Juneau and up the Lynn Canal to Skagway, connecting by way of White Pass with the Canadian telegraph line, and bringing these important points into instant communication with Washington and London.

Few realize the difficulties that have been overcome in building this network of 1,740 miles of wire. Most of the land lines were put in during the best working season, November to February. The mean temperature for these four months was two degrees below zero. Sometimes it was so cold that the mercury froze solid after it had gone as low as 61 degrees below zero. Gen. A. W. Greely, U. S. A., in his last report as Chief Signal Officer, says of the work:

"It is impossible to adequately set forth the tremendous difficulties under which Alaskan military telegraph lines have been constructed and maintained. In general, it is to be premised that not 20 miles of constructed wagon road exists in the country traversed. As a rule, all material has been sledded into the interior in midwinter or carried by pack animals over the roughest imaginable trails. Conditions were so difficult that some coils of wire were carried 145 miles by pack. The magnitude of the work may be inferred by the statement that from Fort Egbert alone, between November 20, 1902, and June 30, 1903, no less than 220 tons of supplies and material were sledded or packed into the interior, it being impossible to move a ton by wagon.

"The construction parties, consisting almost entirely of enlisted men of the Signal Corps and of the line of the Army, worked steadily the entire winter, although the conditions under which field work was done were of the most hazardous and appalling character. As an illustration may be mentioned the fact that from November 1 to the end of the winter, by official reports, 60 feet and 11 inches of snow fell at Fort Liscum, adjoining the Copper River Valley.

"In the interior, while the snowfall was very much less, being only 4 feet 4 inches at Egbert, yet continued and terrible cold made camp life and construction work almost insupportable. The mean temperature at Fort Egbert from November to February, inclusive, a period of four months, was 2° below zero. There were prolonged periods of extreme low temperature, when the mercury remained frozen, the minimum of 61° below zero occurring in January. While the past winter is believed to have been the most severe in Alaska for many years, yet such was the resourcefulness and endurance of the American soldier that the work of construction in the valley of the Tanana was carried on the entire winter without loss of life and with only one serious case of freezing.

"The cold and snow of the winter were, strangely enough, more favorable to completing the system than were the morasses and fires of summer. The final completion of the telegraph system was made just as an extensive forest fire devastated the upper valley of the Tanana, burning thousands of square miles of valuable timber and destroying more than 100 miles of telegraph line. The damage was the more serious in that the 100 miles of line destroyed were burnt out not as a whole section, but at vari-

ous points along the distance of 250 miles over which the fire extended."

The cable to connect Sitka and Seattle has been made and is now at San Francisco. It will be laid in the early spring of 1904. The cable was authorized by Congress March 3, 1903. Since that date the entire cable, 1,300 miles long, has been manufactured near New York, transported around Cape Horn, and delivered in perfect condition at San Francisco after its voyage of 16,000 miles; the complicated machinery to handle the cable and the delicate instruments necessary to operate it have been planned by the Signal Corps, made to order in Great Britain, and delivered in San Francisco, and the route from Seattle to Sitka has been surveyed by Capt. J. F. Pratt, of the Coast and Geodetic Survey steamer *Patterson*, through the courtesy of Supt. Otto H. Tittmann, of the Coast and Geodetic Survey. This is a remarkable record of achievement in seven months, March to September, inclusive.

The gradual transfer of the military telegraph and cable lines in the Philippines to the insular government was begun during the year. It is estimated that if a fee of two cents a word had been charged for all official messages the receipts of the lines would have been $1,500,000. The cost of construction and maintenance was less than $500,000, so that there was a net saving to the government of over one million dollars.

GEOGRAPHIC LITERATURE

The Island of Formosa. Past and Present. History, People, Resources, and Commercial Prospects; Tea, Camphor, Sugar, Gold, Coal, Sulphur, Economical Plants, and Other Productions. By James W. Davidson, F. R. G. S., consul of the United States for Formosa. With two new maps, frontispiece in color, one hundred and sixty-eight illustrations from photographs, and colored reproductions of two Chinese posters. Imperial 8vo. Pp. 720. New York: The Macmillan Company. 1903.

Mr Davidson, U. S. Consul to Formosa since 1895, has written a very comprehensive description of Formosa, past and present. His narrative history of the islanders, of their struggles against the Chinese, the Tartars, the Dutch, and the pirates, and of their frequent rebellions and continual battling against the aborigines in the mountains, makes interesting reading. His chapters on the various industries of Formosa are specially valuable. The island is extraordinarily fertile; it has vast camphor forests, an unlimited supply of coal, gold mines, salt, petroleum, sulphur, and other deposits, and many plants of economic value—indigo, fiber, and paper plants, and many others. Perhaps the most notable chapter of the volume is that describing his visit to Botel Tobago Island.

Botel Tobago (Kotosho) Island is a dependency of Formosa, and some 35 miles from the south Formosan coast. The island is only some 30 miles in circumference, and consists of a single long hill, on the shores of which the savages live. To the ethnologist, the inhabitants of this little land are, perhaps, the most interesting of all the savages in Japan's new colony, and doubtless there are few tribes in the whole East who live in such a primitive manner and who have had so little communication with the outside world as the Botel Tobago savages. An occasional Chinese junk stops off the island to exchange wares, but otherwise the island

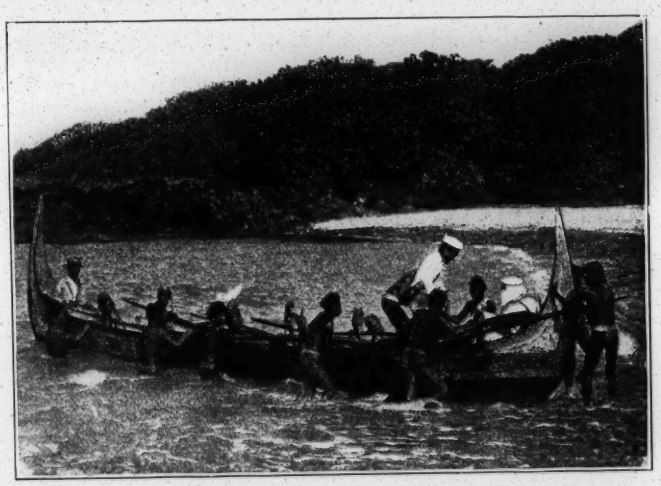
had never been visited until a Japanese commission, accompanied by Mr Davidson, landed and explored it soon after the Chinese-Japanese war.

Mr Davidson's account of the island is the first that has been published. The following extracts are reprinted here with his permission. The photographs have not been previously published.

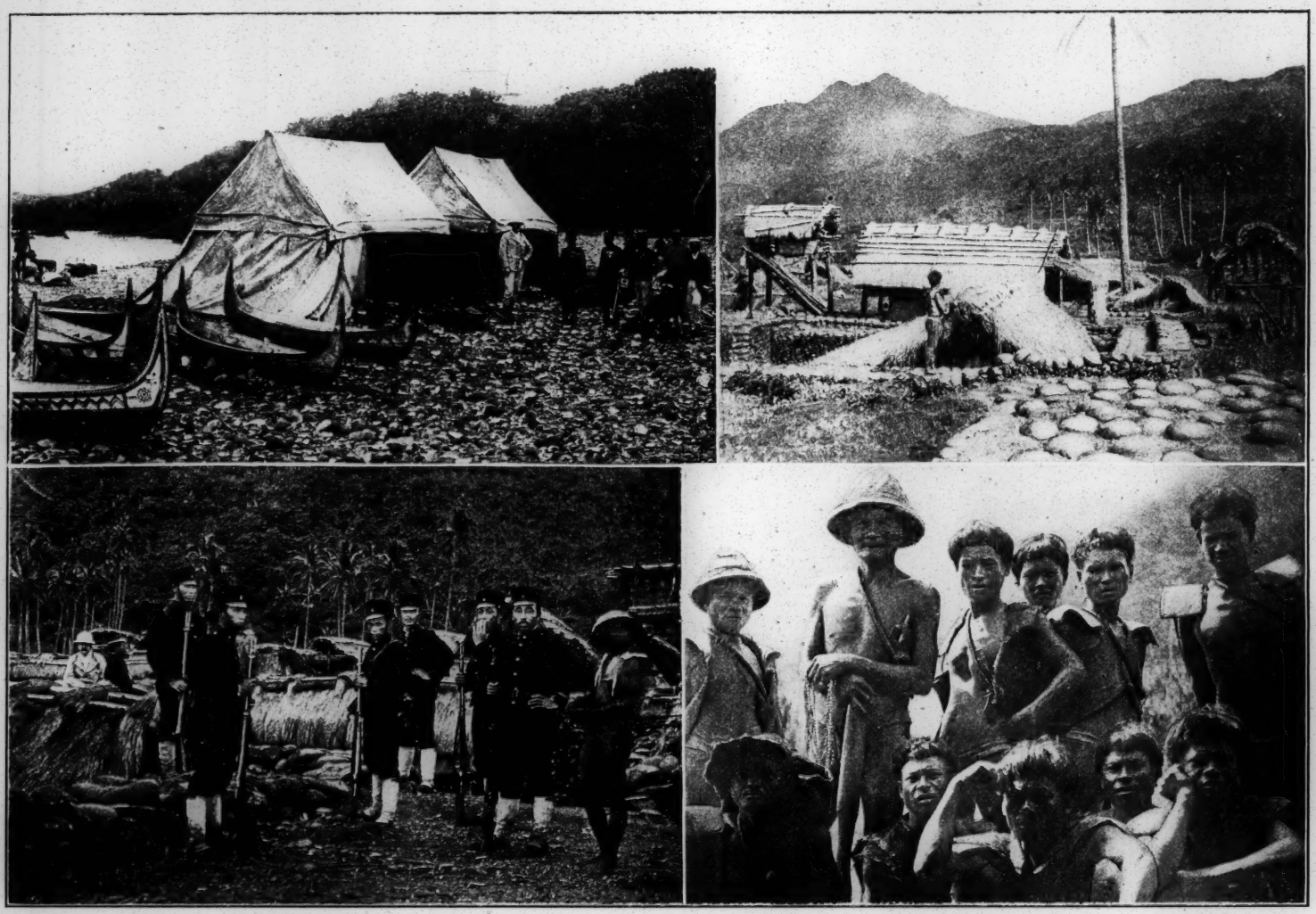
The inhabitants of Botel Tobago, some 1,200 or 1,300 in all, occupy eight villages; Yakunawymen, the largest settlement, being on the west coast and containing about fifty houses. The natives are small, averaging only five feet two inches in height. They are yellowish brown in color, and, with one individual exception, possess straight hair, black with a brownish tint.

The habitations of the Botel Tobago savages are very remarkable, not to say unique. Each family possesses a splendid walled and stone paved compound, wherein are three distinct houses, attesting the cleverness of the natives and their desire to obtain the maximum of comfort. One house, built half under ground, is their winter residence. For the warmer weather they have a comfortable building, elevated some feet above ground, and for protection against the heat of summer they have a tower-like edifice, sufficiently elevated to catch the cool breezes. These huts serve not only as habitations, but also as workshops and storehouses. In construction a considerable amount of wood is used as supports and cross-beams and for the inner floor, ceiling, and walls of the two large huts. The elevated structure is of wood, bamboo, and straw. A shelf projects level with the entrance, and the inhabitants are obliged to mount this and then crawl in on all fours, the doorway not being much larger than the entrance to a good-sized dog kennel.

The room is like a large flat box, some 7 by 8 feet, and is so low that one lying down can almost touch the ceiling with uplifted hands; but the savages always squat, so the place is high enough for them. Human figures and various rather pleasing geometrical designs are engraved on the interior woodwork; the only other decorations (for such they are considered by the natives) are rows of animal jaw-bones, hung from side to side. The roof is thatched with a strong dried grass, and a similar material appears on the outer walls. The two buildings supported on piles have circular boards surmounting each post to keep off the large rats that literally overrun the island at night. During my first two nights in the island I shared a tent with Major Kikuchi, but on the third night a terrific tropical downpour threatened to sweep us out into the sea,



Landing on Botel Tobago



Scenes on the Island of Botel Tobago, Formosa

Photos by James W. Davidson

1. Camping on the shore; several of the beautiful boats of the islanders in the foreground
2. The three houses of a native; one for winter, underground; one for mild weather, and for summer heat. (See page 469)
3. Mr Davidson's Japanese guard
4. A group of islanders

and we then removed to one of the native houses, which we found dry and, under the circumstances, comfortable.

All the boats appear to be of one model. They are beautifully rounded, and both stem and stern are shaped alike, being prolonged upward in a graceful curve ending in a point, from which, in time of festivity, is projected a bunch of feathers or some other decoration. It is a built-up boat, and, considering the crude tools used in its construction, is a remarkably creditable affair. The tribe possess no saws, and consequently each plank is adzed down, thus obtaining but one plank from a tree. These planks, forming the sides of the boat, are so carefully shaped that they fit very closely. Holes are bored near the seams, through which rattan lastings are passed and drawn tightly, literally tying the parts together. The bottom planks are fastened to the strong V-shaped keel in the same manner. As in the Solomon Islands, the principal tool used is an adze. In Botel Tobago this implement is so made that it can be converted into a chisel by inserting the blade end first into the handle.

There are no dogs or cats on the island, which accounts for the great pest of rats. Immense rodents as large as the American musk-rat literally overrun the villages at night. One could see them after dark, chasing about the place without the least sign of fear, as hungry hogs would overrun a garden, and it is no exaggeration to say we feared the rats more than we feared the natives.

The South American Republics. By Thomas C. Dawson. In two volumes. Illustrated with photographs and maps. Vol. I. Pp. xvi + 525. 5½ by 8 inches. New York: G. P. Putnam's Sons. 1903.

Mr Dawson has been for many years American consul to various capitals of South America. This work is in two parts, of which the first is out; the second will be published in a few months. The present volume describes Argentina, Paraguay, Uruguay, and Brazil. It is well written, interesting, and reliable and is commended to all who are seeking a good book on South America.

Two South American Republics, Argentina and Chile, may be called prosperous; there are evidences of an awakening in certain sections of a third, Colombia, which may bring equal good fortune to that state. Brazil is also becoming unified, and, according to Mr Dawson, is developing a solidity as a nation which is not generally realized.

Several of the author's statements about this republic, whose area is greater than that of the United States excluding Alaska, are worth quoting:

"Capital is slowly accumulating, and a healthful tendency toward industrious habits and the employment of reasonable and moderate methods in exploiting the great untouched natural resources of the country is evident.

"Leaving out immigration, the Brazilian people have shown a steady natural increase of nearly 2 per cent per annum during this century. The total population has multiplied from less than three to more than eighteen millions. Not a fiftieth part of the territory is cultivated; its resources have never been studied, much less developed."

The Brazilians have the additional advantage of inheriting directly a European civilization. They "are too firmly established, too numerous and prolific, and possess a too highly organized and deeply rooted civilization to be in danger of expulsion or political absorption. Immense immigration into South America is inevitable as soon as the pressure of population is strongly felt in Western Europe and North America. This may transform Brazil economically, but the new conditions will have to fit themselves into the political and social framework already in existence."

for mild weather, and for summer heat. (See page 469)

4. A group of islanders.

3. Mr Davidson's Japanese guard islanders in the foreground

Mr Dawson expresses great faith in the Argentine Republic:

"The industrial impetus already acquired by the Argentine Republic is sufficient to carry it over all obstacles, and it seems assured that there will be a rapid settlement of the whole of this immense and fertile plain. Here Nature has done everything to make communication easy, and a temperate climate insures crops suited to modern European civilization.

"Two grave perils have so far been encountered, namely, a tendency toward political disintegration and an abuse of the taxing power. The former is now remote; for since the railways began to concentrate wealth and influence at Buenos Aires and to destroy the prestige and political power of the provincial capitals, the natural structure built by the patriots of 1853 has stood firmer each year.

"Argentina has had a bitter lesson of the evils of governmental extravagance and still groans under the burden of a debt which seems disproportionately heavy, but the growth of population and wealth will soon overtake it, and the very difficulties of meeting interest are the cause of an economy in administration, of which the good effects will be felt long after the debt itself has been reduced to a reasonable *per capita*. A nation is in the process of formation in the Plata Valley whose material greatness is certain and whose moral and intellectual characteristics will have the widest influence on the rest of South America."

In Search of a Siberian Klondike. By Washington B. Vanderlip and Homer B. Hulbert. With many illustrations. Pp. xiv + 315. 5½ by 8½ inches. New York: The Century Co. 1903. $2.00 *net.*

One of the most interestingly illustrated books of exploration published in a long time. The story is well told. Occasionally the author slips up in his statements—as, for instance, when he recommends the United States to import their reindeer for Alaska from Kamchatka instead of from Lapland. He is apparently ignorant of the fact that the United States Government has been importing reindeer from across Bering Sea ever since 1891, and has only once brought reindeer from Lapland, in the winter of 1898, when deer were needed immediately to rescue the miners in the Yukon Valley. The Alaskan and Siberian herds could not be drawn on then, because navigation had been closed by the winter ice.

BOOKS RECEIVED FOR REVIEW

The Book of Ser Marco Polo. Translated and edited by Col. Sir Henry Yule. Third edition. With memoir of Henry Yule by his daughter. Profusely illustrated. Vol. I, pp. cii + 462; vol. II, xxii + 662. 6 by 9 inches. New York: Imported by Charles Scribner's Sons. 1903. $16.00 *net.*

On the Polar Star in the Arctic Sea. By the Duke of the Abruzzi. 2 vols., 8vo. With maps and illustrations. New York: Dodd, Mead & Co. 1903. $10.00.

Aus Insulinde, Malayische Reisebriefe. Von Ernst Haeckel. Illustrated. Pp. xi + 261. 6½ by 9½ inches. Bonn: Verlag von Emil Strauss. 1901.

Geographic Influences in American History. By Albert Perry Brigham. With many illustrations. Pp. 366. 5 by 7½ inches. Boston: Ginn & Co. 1903.

To California and Back. By C. A. Higgins. With many illustrations. Pp. 317. 5½ by 8 inches. New York: Doubleday, Page & Co. 1903. $1.50 *net.*

Vacation Days in Greece. By Rufus B. Richardson. Illustrated. Pp. 240. 5½ by 8½ inches. New York: Charles Scribner's Sons. 1903. $2.00 *net.*

American Railways. By Edwin A. Pratt. Pp. 309. 5 by 9 inches. New York: The Macmillan Co. 1903.

Austro-Hungarian Life in Town and Country. By Francis H. E. Palmer. Illustrated. Pp. 299. 5 by 7½ inches. New York: G. P. Putnam's Sons. 1903.

Handbook of Climatology. By Dr Julius Hann. Translated by Robert De Courcy Ward. Pp. vi + 437. 6 by 9 inches. New York: The Macmillan Co. 1903. $3.00 *net.*

Special Method in Geography. By Charles A. McMurry. Pp. vi + 217. 5¼ by 7½ inches. New York: The Macmillan Co. 1903.

Yearbook of the Department of Agriculture, 1902. Edited by Geo. W. Hill. Profusely illustrated. Pp. 912. 6½ by 9 inches. Washington: Government Printing Office. 1903.

The Turk and His Lost Provinces. By William Eleroy Curtis. Illustrated. Pp. 396. 6 by 9 inches. New York: Fleming H. Revell Co. 1903.

Winter India. By Eliza Ruhamah Scidmore. With many illustrations. Pp. xvi + 400. 6 by 8½ inches. New York: Century Co. 1903.

American History and its Geographic Conditions. By Ellen C. Semple. Illustrated. Boston: Houghton, Mifflin & Co. 1903. $1.25 *net.*

The Texts and Versions of John De Plano Carpini and William De Rubenquis. As printed for the first time by Hakluyt in 1598, together with some smaller pieces. Edited by C. Raymond Beazley. Pp. 345. 5½ by 8½ inches. 1903. Printed for the Hakluyt Society, 1903.

The Philippine Islands. 1493 to 1808. Volume VI. By Emma H. Blair and James H. Robinson, editors. Pp. 320. 6½ by 9½ inches. Cleveland: The Arthur H. Clark Co. 1903.

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A Monograph of the Tsetse-Flies. By Ernest Edward Austen. With a chapter on Mouth-Parts, by H. J. Hensen. Illustrated. Pp. ix + 319. 6½ by 10 inches. Printed by order of the trustees of the British Museum. London. 1903.

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Central Europe. By Joseph Partsch. With maps and diagrams. Pp. 358. 6 by 9 inches. New York: D. Appleton & Co. 1903. $2.00 *net.*

Central Asia and Tibet. Towards the Holy City of Lassa. By Sven Hedin. In two volumes. Illustrated from drawings and photographs. Volume I. Pp. xvii + 608. Volume II. Pp. xiv + 664. 7 by 9½ inches. New York: Charles Scribner's Sons. 1903.

Handbook of the Saint Louis World's Fair of 1904. By Charles M. Kurtz. Illustrated. Pp. 115. 5½ by 8½ inches. Saint Louis: Gottschalk Printing Company. 1903.

RECENT PUBLICATIONS BY THE U. S. GOVERNMENT

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Birds of a Maryland Farm. A Local Study of Economic Ornithology: Sylvester D. Judd.

The Animal Industry of Argentina: Frank W. Bicknell.

Egyptian Irrigation. A study of irrigation methods and administration in Egypt: Clarence T. Johnston.

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U. S. FISH COMMISSION

Aquatic Products in Arts and Industries—Fish Oils, Fats, and Waxes, Fertilizers from Aquatic Products: Charles H. Stevenson.

Utilization of the Skins of Aquatic Animals: Charles H. Stevenson.

Statistics of the Fisheries of the Middle Atlantic States: Barton W. Evermann.

NATIONAL GEOGRAPHIC SOCIETY

REGULAR MEETINGS OF THE SOCIETY

THESE meetings will be held in the Assembly Hall of Cosmos Club at 8 p. m. until the new home of the Society, Hubbard Memorial Hall, is completed. No tickets are required for these meetings.

December 4.—"The Work of the Bureau of Plant Industry." Dr B. T. Galloway.

December 18.—"Early Spanish Cartography of the New World," by Prof. E. L. Stevenson, of Rutgers College.

January 8, 1904.—Annual Meeting; followed by an address by Prof. Wm. M. Davis, of Harvard University, on "A Summer in Turkestan."

January 22.—"The Work of the Bureau of Insular Affairs." Col. Clarence R. Edwards.

February 5.—"The Work of the Bureau of Statistics." Hon. O. P. Austin.

February 12.—"The Work of the Bureau of Fish and Fisheries." Dr B. W. Evermann.

March 4.—"The Work of the National Bureau of Standards." Dr G. M. Stratton.

March 18.—"The Work of the U. S. Biological Survey." Dr C. Hart Merriam.

POPULAR LECTURES

The Popular Lectures will be delivered in the National Rifles' Armory, 920 G street, at 8 p. m., on the following dates (tickets are required):

Saturday, December 12.—"Marches and Movements of Arnold and André." By Mr W. W. Ellsworth, of the Century Company. Illustrated.

Friday, January 15, 1904.—"Travels in Arabia and Along the Persian Gulf," by David G. Fairchild, Special Agent of the U. S. Department of Agriculture. Illustrated.

Saturday, January 30.—"Joys of the Trail," by Mr Hamlin Garland, author of "The Captain of the Gray Horse Troop," etc. Illustrated.

Announcement of definite dates for the following lectures in this course will be made later:

"Conditions in Macedonia," by Dr Edwin A. Grosvenor, of Amherst College. Illustrated.

"The Louisiana Purchase Exposition." By Hon. David R. Francis, President of the Louisiana Purchase Exposition. Illustrated.

Provisional arrangements have also been made for addresses on—

Little Known Peoples of Mexico.

Russia and Japan in Korea.

The Alaskan Boundary Decision.

The general subject of the Afternoon Course of popular lectures is "The Growth of Diplomacy." The special topics and the names of the speakers will be announced in a later program. The first of the series will be given on Saturday, February 27, and the succeeding lectures on March 5, 12, 19, and 26.

These lectures will be illustrated.

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